



**1986
ANNUAL
REPORT**

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES



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Annual Report 1986

*Louisiana Department of
Wildlife and Fisheries*

Edwin W. Edwards, Governor

*J. Burton Angelle Sr., Secretary
Virginia Van Sickle, Deputy Secretary
Wilson Byrd, Undersecretary
William S. "Corky" Perret, Assistant Secretary
Joe L. Herring, Assistant Secretary*

Wildlife and Fisheries Commission

*George N. Gray, Chairman, Shreveport
Dr. Jack T. Cappel Jr., Alexandria
M. Lyle Crain, Grand Chenier
Don Hines, Bunkie
Joe Palmisano, Chauvin
Mark A. Roberts, Shreveport
Dale Vinet, Delcambre*

Division Chiefs

*Johnnie Tarver, Fur/Refuge
Hugh Bateman, Game
Ray Montet, Enforcement
Bennie Fontenot, Fish
Bob Dennie, Information/Education
Mary Mitchell, Fiscal Officer*

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A MESSAGE FROM THE SECRETARY



J. Burton Angelle, Sr.

This annual report to the Governor and members of the Louisiana Legislature describes the many ongoing programs and responsibilities of the Department of Wildlife and Fisheries intended to enhance, protect, perpetuate and properly harvest the state's bountiful wildlife and fisheries resources

The diversity and abundance of Louisiana's renewable wildlife resources are without equal in these United States and quite possibly the world. We lead the nation in the harvest of seafood, waterfowl and furbearing animals, just to name a few.

As director of the agency charged as watchdog over these resources, I can assure you that we take our job seriously. As I have often said, we are blessed with a potpourri of some of the brightest and most dedicated wildlife workers in the world. Their chosen profession is a lifestyle far in excess of any eight-hour days or forty-hour weeks

This, I think, will become increasingly obvious to you the more you dissect this report. I won't belabor the point here. Instead, I will take the few minutes I have and pass out a round of well deserved thanks.

The first few months of 1986 were some of the darkest days I personally have experienced during my unprecedented almost three terms as Director of Wildlife and

Fisheries. I don't like having to tell talented and dedicated men they no longer have a job or that they cannot purchase desperately needed supplies. I don't like standing before sportsmen and sportswomen and telling them we can no longer afford to perform to the level they expect and deserve. I don't like sitting idly by and watching things I know need to be done go undone.

This was exactly the position I was in at the start of last year. It is one with which I know you can empathize.

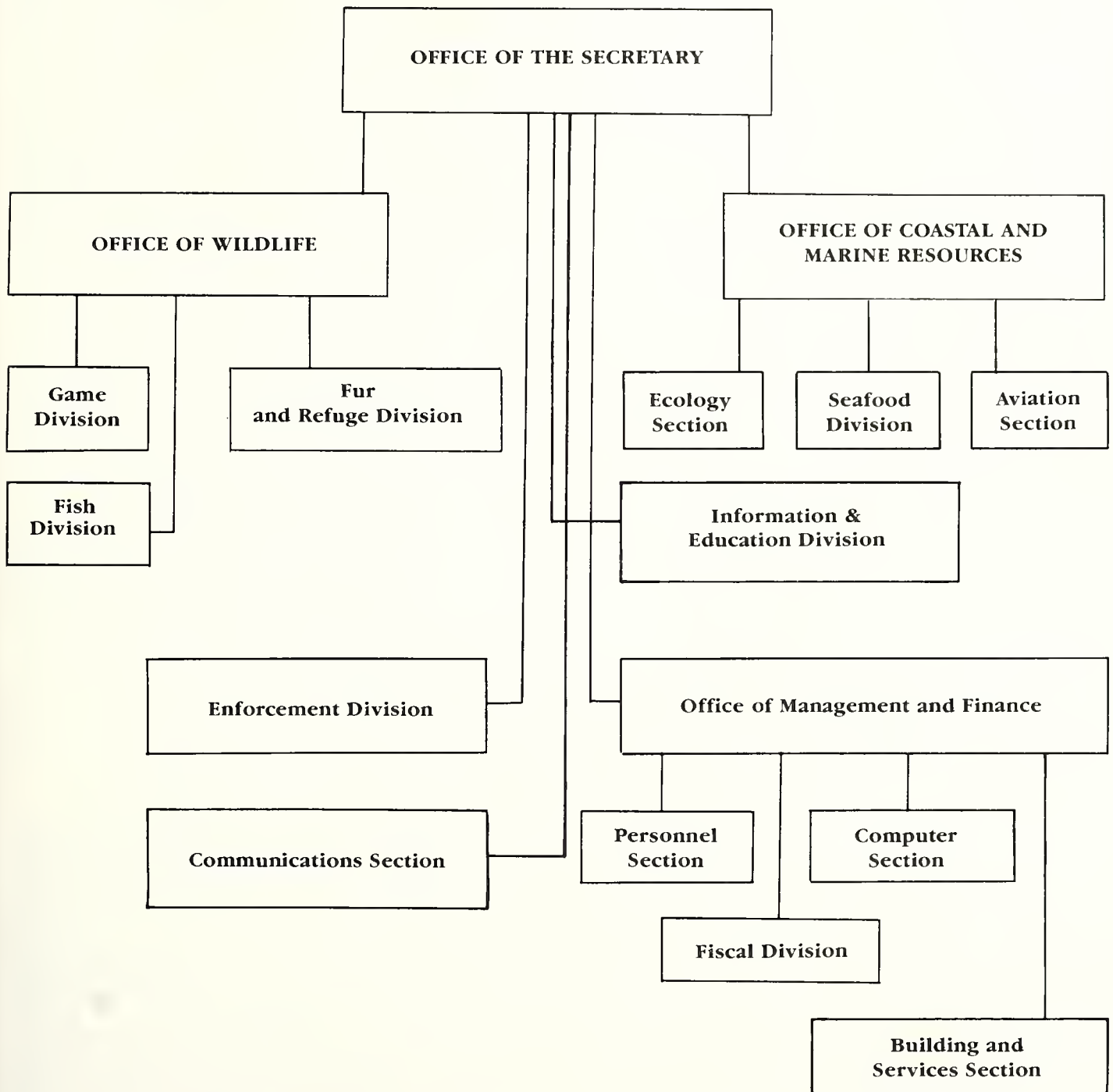
With the help, advice and support of sportsmen and commercial fishermen and trappers we developed a plan to allow us to continue our management activities. It involved a complete revamp of both recreational and commercial fishing licenses and substantial increases in hunting, fishing and trapping licenses.

We had a plan and the support of sportsman, commercial fishing and trapping organizations. The lone thing needed to make the plan a reality was a Legislature and Governor willing to listen and courageous enough to get behind such a drastic change from the status quo.

You were both. With all the problems you faced, you took the time to listen intently to what we had to say. And, you had the courage to vote your conviction.

I salute you.

ADMINISTRATIVE STRUCTURE CHART



Office of the Secretary

The secretary, as chief administrative officer of the Department of Wildlife and Fisheries, is responsible for all wildlife and fisheries resource management activities in Louisiana. He is also deeply involved in vital conservation matters on both national and international levels.

Administration of the Office of Management and Finance, the Enforcement Division, the Information and Education Division and the Communications Section is directly in the Office of Secretary, while the administration of the other major divisions, Game, Fish, Fur and Refuge and Seafood Divisions and Aviation and Ecology Sections, is delegated to assistant secretaries.

The secretary is assisted in the administration of the department by a deputy secretary, who is chiefly involved with the management of the various offices and divisions with the Office of the Secretary.

Within the structure of the Office of the Secretary, the Office of Management and Finance, which includes the Fiscal Division and the Personnel, Building and Services and Computer Sections, is administered by the undersecretary.

Enforcement Division

The Enforcement Division is responsible for enforcing all laws enacted by the Louisiana Legislature relative to wildlife and fisheries resources, applicable portions of the state's Boating Act, and federal regulations pertaining to migratory wildlife and endangered species.

Meeting this responsibility has been difficult during the past year due to the state's financial situation. The agents and employees of the Enforcement Division have strived to maintain the high level of service the public expects and deserves.

The division's effort to maintain and, when possible, enhance its level of service has been reinforced by the hiring of 15 wildlife agent trainees to fill some of the openings that occurred during the year. These agents have completed their basic law enforcement training course and also 80 hours of intensive classroom instruction on wildlife related subjects. They have completed their Salt Water Enforcement Patrol training and have returned to their home districts to begin their regular duties.

The hiring of these 15 agents does not mean our numbers have increased, and each of these new agents knows and understands that this makes his daily performance much more important for the overall success of the division in the coming years.

In 1986, agents of the Enforcement Division made thousands of inspections to insure compliance with conservation laws and regulations. These inspections involved hunters, trappers, and recreational and

commercial fishermen. These inspections resulted in over 21,000 citations being issued.

The Covert Operations Section of the division also had a successful year. Several large rings involved in selling both game animals and game fish were broken up. One of these was operating and selling in illegal markets as far away as Chicago.

The year also saw the division remain active in its commitment to boating safety. Realizing the importance of state waters to both recreational boaters and those using their boats for commercial purposes, the division takes this responsibility very seriously. Even though our waterways are almost countless in numbers and miles, they become more crowded each year, and as it once was with cars, our boats get bigger and faster each year. Add to this the problem of alcohol consumption and boat operation, and the importance of boating safety gets very clear.

It is a tragic fact that the Enforcement Division worked 159 boating accidents last year. A total of 105 people were injured in these accidents and 55 people were killed. There is no room on Louisiana waterways for the intoxicated boat operator, so the Enforcement Division will continue to train and certify all agents in the use of Intoximeters. This tool will be used in conjunction with the implied consent law for boat operators to try to reverse the trend in alcohol related accidents.

The Enforcement Division will also continue its involvement in search and rescue. Our geographical location and climate lend themselves to many flood situations throughout the state, and, as in the past, our resources of manpower and equipment will be used in saving lives and property.

Information and Education Division

The Information and Education Division, which reports directly to the secretary, keeps the public informed of department activities and conducts educational programs to promote sound conservation and safety practices.

All sections of the I&E Division worked together during the year to provide increased attention to the safety of Louisiana citizens engaged in recreational pursuits in the outdoors.

To combat the state's disproportionate toll of boating accidents and fatalities, 34 separate boating safety clinics were conducted as a result of which 763 persons were certified as safe boaters.

Meantime, for the second year, the Hunter Safety Section maintained in high gear its Legislature-mandated program to provide safety training for all hunting license

applicants born on or after Sept. 1, 1969. The section's 1,228 volunteer instructors offered a total of 489 firearms safety courses to 17,264 students. Of these, 15,223 gained certification as safe hunters.

In addition, a second shooting range was opened—the Sherburne Range Facility in the department's Wildlife Management Area near Krotz Springs. Free to the public, the facility is regarded as one of the finest such installations in the entire South.

Among other I&E activities in fiscal 1985-86, the division's Education Section presented 1,558 programs designed to acquaint the public with wildlife management and conservation efforts. These programs were attended by 70,359 individuals of all age groups, with emphasis on schoolchildren.

I&E staff members conducted 137 radio and television programs that reached a total audience estimated at 7,360,000. There were 218 boating safety programs presented live to 13,401 people and 99 hunter safety programs presented to 6,118 people.

Division personnel set up 74 wildlife displays at fairs, festivals and conventions in Louisiana which attracted an estimated 512,065 visitors. Besides contributing to these exhibits, the I&E library loaned out 1,592 films and sent 3,724 publications to persons who requested them.

I&E produces and distributes more than 30 different wildlife pamphlets, including hunting and fishing guides, and its bimonthly Louisiana Conservationist magazine is sent free to some 225,000 subscribers.

In 1985-86 the Information Section distributed 124 news releases dealing with wildlife and fisheries management, hunting, fishing, trapping, shrimping and oystering seasons, family recreational opportunities, enforcement, environmental improvement and other topics.

In addition, the Information Section provided its clients—both organizations and private citizens—with news features, photographs, radio and TV public service announcements, documentary motion pictures and slide presentations, and other specialized services.

Communications Section

The Communications Section provides the only 24-hour, toll free public assistance "800" telephones lines in the department. This service now consists of two lines. One line, 1-800-442-2511, is used for reporting game violations under the reward-based "catch a thief" project named Operation Game Thief. The other line, 1-800-325-7067, is used for general information, season rules and regulations, license problems, and to report boating accidents and other emergencies. It also provides department personnel with access to the boating registration terminal, National Crime Information Center terminal, Lake Pontchartrain Causeway Avoidance Warning System terminal, long range single side band radio communication to the department's large vessels, VHF radio contact

with the U.S. Coast Guard, and FM low band radio contact with wildlife agents, aircraft, small boats and outlying camps.

The section also operates as an interface with other agencies providing coordinated information on overdue hunters and fishermen, search and rescue, and other emergency activities on a 24-hour basis.

Four field service technicians provide vital on-the-spot statewide repairs and installation of all mobile communication and electronic equipment used by the department. Major repairs are handled by the central radio shop that consists of two bench-grade radio technicians and one technical supervisor.

The Communications Section also provides public address systems and legal recordings for all department board meetings and public hearings conducted by the department.

The department's current radio system consists of 38 base stations, 1,020 mobile units, 447 portable units, 141 boats and five aircraft.

Office of Management and Finance

The Office of Management and Finance is administered by the undersecretary and is instrumental in the implementation of programs and acquisition of equipment by all divisions of the Department of Wildlife and Fisheries. Within this office are the Fiscal Division and three sections: Personnel, Computer, and Building and Services.

Fiscal Division

The Fiscal Division is responsible for all financial requirements of the entire department. This division is composed of the following sections: Fiscal Officer, General Accounting, Federal Aid, Payroll, Purchasing, Property Control, Revenue Operations, License Sales and Motorboat Registration.

Duties of the fiscal officer include preparation of the department's annual budget, all financial statements and annual fiscal reports. This section also maintains records on the department's workers compensation claims, liability insurance, telecommunications equipment inventory and service, and vehicle operation costs.

The department's annual operating budget expenditures for fiscal year 1985-86 totaled \$31,651,753. All disbursements are handled by the Fiscal Division. Revenue recorded by the department for 1985-86 is as follows:

Conservation Fund:

Royalties	\$ 6,366,422
Rentals on land	614,348
Other income on land	113,671
Interest income	77,705
Severance taxes	2,309,599
License sales	8,677,327
Miscellaneous	506,834

Rockefeller Refuge Fund:

Royalties	\$ 7,177,327
Rentals on land	94,578
Other income on land	574,000
Interest income	379,163
Miscellaneous	35,787

Marsh Island Refuge Fund:

Royalties	\$ 289,638
Interest income	347,304
Rentals on land	157,128
Other income on land	126,977
Miscellaneous	39,753

State Wildlife Refuge & Game Preserve Fund:

Rentals on land	\$ 103,643
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Louisiana Help Our Wildlife:

Private donations	\$ 12,740
Interest income	292

Seafood Promotion & Marketing Fund:

	\$ 346,967
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Interagency transfers

	\$ 72,788
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LOOP

	\$ 198,764
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Federal

	\$ 4,927,299
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Total Revenue

	\$ 33,447,076
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Personnel Section

During 1986, the Personnel Office in conjunction with division chiefs, section heads and Civil Service developed new job specifications for all new classes to be utilized in the new reclassification system to be effective Jan. 1, 1987.

This office voiced its concerns on the issue of payroll deduction of insurance premiums for the retirement benefits of surviving spouses. As a result of our efforts, the State Employees Group Benefits Board after review acted

favorably on our recommendation for automatic deductions. This procedure assists all surviving spouses and all state agencies.

An early retirement incentive plan, Act 144 of 1986, was passed by the Legislature in July. Act 144 had many discrepancies and created problems. The law was eventually declared unconstitutional and was amended and re-enacted through Act 3 of 1986. The Personnel Office computed estimates, aided employees with completion of retirement papers and answered many inquiries. This office processed approximately 25 retirements under this act.

In November, many new Health Maintenance Organizations became available to departmental employees. The Personnel Office assisted employees in obtaining information and completing necessary forms.

Assistance with personnel related matters is provided to a wide range of individuals, including job applicants, active employees, retirees, former employees and surviving spouses.

The section continues to strive toward a comprehensive personnel management program.

Computer Center

During the year, the Computer Center continued its efforts to assist in moving the department forward. This was achieved by making available additional information for all offices within the department through computerized means via telecommunications.

Additional personal computers were placed in offices throughout the state, enabling the department to perform needed functions using in-house developed software packages as well as vendor software packages. In doing so, a more effective means of reaching the department's goals was accomplished.

Building and Services Section

The Building and Services Section serves the important function of building maintenance for Wildlife and Fisheries offices in Baton Rouge and New Orleans and stocks general office supplies for the entire department.

In addition, it also provides services to departmental personnel including, but not limited to, handling the department interoffice, incoming and outgoing mail; distribution of office supplies statewide; volume copying of books and publication; and printing.

Office of Wildlife

The Office of Wildlife, supervised by one of two Assistant Secretaries reporting directly to the Department Secretary, oversees the state's wildlife and fisheries resources. The office comprises three divisions: Fish, Game, and Fur and Refuge.

Fish Division

Louisiana's vast fishery resources are vital to the state's economy from the standpoint of both recreation and commerce. The Fish Division is responsible for managing, protecting, conserving and replenishing those resources, and for controlling undesirable aquatic vegetation that hampers fisheries management, navigation, and fisherman access in Louisiana waterways.

Certain programs of the division that deal with sport fish restoration (research, survey, development and technical assistance) are funded wholly or in part through the Dingell Johnson federal aid program. Recently, federal legislation was enacted that created the Wallop-Breaux Federal Aid Program. These funds are in addition to the on-going Dingell-Johnson funds and will greatly increase the fish restoration programs in the state. Initial plans for the use of these funds will be constructed of fisherman access areas (boat ramps, fishing piers, bank access, etc.) and enlargement and improvement of the division hatchery system.

Fisheries Section

The objective of the Fisheries Section is to manage fish populations and habitats for the preservation and improvement of sport and commercial fishing, located primarily in freshwater areas of the state. Activities include:

Lake Management Program

In 1986 under this program, 33 lakes were sampled with rotenone to determine fish species composition and pounds of fish per acre. From these data, management plans and recommendations for harvest regulations were formulated. Recommendations for lake drawdown comprised 20,000 acres, increasing potential fishing efforts to 110,120 man-days for an economic value gain of \$2,202,400.

Farm Pond Extension Program

Fisheries biologists provide advice and technical assistance to farm pond owners throughout the state. Fingerling largemouth bass, Florida largemouth bass and bluegill are furnished to pond owners who meet require-

ments for stocking. In 1986 advice and fish stocking operations were offered to the owners of 1,170 ponds totalling 8,100 surface acres. These pond stockings resulted in providing 283,000 man-days of sport fish recreation for an economic value of \$2,835.00

Fish Hatchery Program

There are three state owned fish hatcheries located at Monroe, Forest Hill and LaCombe comprising 40 acres of production ponds. These hatcheries produced 2,552,137 bluegill, 763,211 Florida largemouth, 167,000 copernose bream, 4,150 flathead catfish and 691,898 hybrid striped bass fingerlings for stocking in public water bodies and farm ponds.

Additional fish were provided from the U.S. Fish and Wildlife Service. These numbers and species stocked in Louisiana water bodies and streams included 81,120 channel catfish, 138,265 blue catfish, 104,000 black crappie, 149,372 hybrid striped bass and 845,000 striped bass.

Florida Largemouth Bass Program

Ten lakes throughout the state were stocked with 625,575 Florida largemouth bass fingerlings to establish trophy-size Florida bass fishing in Louisiana. These included Caney Lake, Bundick Lake, Spanish Lake, Miller Lake, Cazan Lake, Belson Lake, Rodemacher Lake, Ouachita WMA, Nantachie Lake, and New Orleans City Park Lake. A total of 8,000 fingerlings were also stocked in several roadside borrow pits in Vermilion Parish and marshes in Terrebonne Parish. The Vermilion River in Lafayette Parish was stocked with 92 adult fish.

Striped Bass Program

The striped bass program in Louisiana is designed for the biological control of shad populations in the state's reservoirs and oxbow lakes while providing a highly desirable sport fish. Excellent populations of striped bass/hybrid striped bass presently occur in many water bodies throughout the state. During 1986, 715,379 striped bass were stocked in Toledo Bend Reservoir and 20 other lakes throughout the state were stocked with 651,218 hybrid striped bass. An additional 172,581 striped bass fingerlings were stocked in coastal streams.

Grass Carp (White Amur) Monitoring Program

The Department initiated a study of triploid grass carp in a private lake in Central Louisiana. Unlike the diploid or normal grass carp, the triploid grass carp is supposed to be sterile. This feature would allow fishery biologists to stock grass carp into water bodies with aquatic weed

problems without the fear of introducing an exotic fish capable of upsetting the delicate balance of our inland and coastal habitat.

Ten to twelve inch fingerlings averaging one-third pound were stocked into the lake in December 1985. Biologists will sample the fish population, water quality and aquatic vegetation for five years to determine the effect of the grass carp on the lake. Several grass carp will be collected each year to determine their growth rate and sexual condition. Grass carp collected one year after stocking averaged 6 1/2 pounds and exhibited no gonad development. Biomass of submerged aquatic plants was reduced by 80 percent and water quality in June and September dropped below the critical level, resulting in moderate fish kills.

University Cooperative Agreements

The Fisheries Section conducted research projects in 1986 in cooperation with two universities. They were Louisiana State University, studying genetic and environmental factors influencing growth of channel catfish and coppernose bluegill; and Auburn University, researching the identification, diagnosis and treatment of fish disease and parasites.

Commercial Fish Farming Extension Program

Commercial catfish farmers benefited during 1986 from assistance and technical advice provided by fisheries section biologists. Biological assistance included spawning, stocking, feeding, water quality checks, parasite and disease problems, harvesting, hauling and marketing. In 1986, our assistance contributed directly to the production of an average of 3,000 pounds per acre in approximately 1500 acres of catfish ponds with a wholesale value of approximately \$3,000,000.

Fish Kill Investigations

Fisheries biologists were again called upon in 1986 to determine the cause of approximately 100 fish kills statewide in public and private bodies of water. Those kills found to be natural die-offs were investigated as to cause, and when feasible, recommendations were given to correct the problem. Kills caused by industrial and domestic pollution were referred to the Department of Environmental Quality.

Boat Ramp Construction and Maintenance

The Fish Division inspects and maintains 41 Department of Wildlife and Fisheries public boat ramps located throughout the state. In addition, as a result of additional federal dollars made available through the recent expansion of the Federal Aid in "Sports Fish Restoration Act", the Fish Division in cooperation with parish and city governments initiated construction on three others.

Dingell-Johnson Fish Restoration Projects

Projects in 1986 by title:

1. Fish Management Coordination
2. Southeastern Cooperative Fish and Disease Study
3. Fish Population Investigation
4. Technical Advice to Owners of Farm Ponds and Lakes
5. Construction of a Water Control Structure for Turbidity Control and Fish Population Renovation in the Larto-Saline Complex, Louisiana
6. Aquatic Vegetation Investigations for Sport Fish Management in Louisiana
7. Public Access and Boating Facilities—Louisiana
8. A Survey of Factors Affecting Fish Production in the Larto-Saline Area
9. Striped Bass Production
10. Flathead Catfish Production
11. Effects of Wire Traps on Gamefish
12. Caney Lake Investigations
13. Channel Catfish Investigations
14. Louisiana's Enhancement to the Marine Recreational Fisheries Statistics Survey
15. Louisiana's Artificial Reef Plan

AQUATIC PLANT RESEARCH AND CONTROL SECTION

This Section conducts research on troublesome aquatic plants in Louisiana waters, provides technical information on control methods, and supervises and conducts a statewide program of spraying waterhyacinths on public waters in Louisiana.

Waterhyacinth Control Program

During the fiscal years 1985/86, the aquatic weed control program provided substantial benefits to millions of Louisianians. Section crews, utilizing boats, airboats, mudboats and roadside spray units, effectively applied herbicide to 20,938 acres of Louisiana's freshwater wetlands infested with waterhyacinths. Another 3,402 acres were treated by helicopter for a total of 24,340 acres.

Special Control Projects

During the year, limited applications of specialized herbicides were used to relieve unusual and severe infestations of aquatic weeds in False River, Bayou St. John and other areas. These applications were temporary measures and served to familiarize local residents with safe and effective use of aquatic herbicides.

Research Programs

Ongoing research projects of the Aquatic Plant Research and Control Section include: Evaluation of new

herbicides to determine their availability and effectiveness for use in aquatic weed control. Continued investigations into the affects of environmental conditions and water fluctuations on hydrilla, as well as evaluations of chemical, biological and mechanical methods of its control.

Lake Management Project

An important part of the stewardship of Louisiana's wildlife and fisheries resources is the skilled and professional management of the state's public lakes. Aquatic vegetation investigations were made by section personnel as to plant species composition and density on lakes. The primary objective of this work was to obtain accurate records of aquatic weed infestations in these lakes which is necessary for the proper formulation of workable management plans.

Noxious Plant Monitoring Program

An ongoing part of the section's responsibilities is the identification and monitoring of noxious non-native aquatic plant populations invading Louisiana's extensive wetlands. In cooperation with personnel of the U. S. Army Corps of Engineers, a close watch is kept on the density, environmental impact and rate of spread of these introductions. A notable example is hydrilla, a submersed aquatic plant that was discovered in Louisiana in 1973 and is now spreading into many areas of the state with the potential of becoming a more serious pest than the waterhyacinth. Another more recent introduction, but also potentially quite troublesome species is salvinia. This relative new-comer to the state has begun making its appearance in several areas of South Louisiana and is being monitored very closely.

Technical Assistance Program

Section biologists provide advice and technical assistance to private pond owners and municipalities concerning aquatic vegetation management problems. In addition to offering professional recommendations for the establishment of proper management programs through this popular extension program, biologists also provide aquatic plant species identification assistance for the inquiring public on request.

Other Projects

Section personnel are presently undertaking a project to map and contour all major lakes built in the state since 1972, as well as updating earlier maps on several additional lakes as needed. These maps should provide valuable information to sportsmen and lake managers alike.

Plans are also being developed for the publishing of a full-color pictorial guide to the aquatic plant species of Louisiana. Field personnel are presently collecting photo-

graphs throughout the state for inclusion in this booklet. Both public awareness and interest in our aquatic ecosystems should be heightened by this informative publication.

FUR AND REFUGE DIVISION

The activities of the Fur and Refuge Division can be divided into four major categories: managing land which the Department owns or leases; research into new and improved management practices for the State's fur, alligator and other wildlife resources; direct land management and supervision of the State's fur and alligator resources; administration of the Louisiana Natural Heritage Program.

LAND MANAGEMENT

The Fur and Refuge Division is responsible for the management, improvement, and protection of five refuges and four wildlife management areas. With the exception of Coulee Wildlife Refuge, all of the areas are in the coastal marsh zone of South Louisiana. Refuges comprise 177,000 acres and wildlife management areas comprise 251,000 acres.

Management practices employed on the refuges and wildlife management areas are primarily directed toward improving wetlands for resident and migratory waterfowl. The multiple-use management concept is used wherever feasible, so that many other aquatic based animals, including furbearers, fish and resident game and nongame birds, also benefit.

Public demand for recreational use of refuges and wildlife management areas continues to increase. Sport fishing, crabbing, and nature study are very popular activities on wildlife management areas.

An extensive law enforcement program is carried out on all Fur and Refuge Division managed property. Mineral activities on all the areas are closely monitored. Each activity is individually reviewed and must comply with the Department's mineral regulations, Deeds of Donations and various agreement letters.

Rockefeller Refuge

The state-owned Rockefeller Refuge, located in Cameron and Vermilion Parishes, comprises some 85,000 acres of prime coastal marshland. Impoundments varying in size from 480 to 5,680 acres have been constructed on the refuge to house the over 400,000 waterfowl that spend the winter on the area each year. Year-round residents include nutria, muskrat, raccoon, otter, mink, deer, and alligator. Rockefeller Refuge also provides excellent habitat for a diverse and abundant group of wading birds.

During 1986, several levee rebuilding projects were completed. Approximately 5,000' of levee north of Lake 2 in the experimental goose pasture was raised and reshaped. Also, an airstrip, 4,000' long and 100' wide, was constructed south of the East End Boat Dock. This airstrip will be capped with native sand in order to insure a smooth, permanent year round landing surface.

Several gated water control structures were repaired and new gates were installed in the levees of various management units. The Lake 5 structure was repaired and the boat passage gate was removed. Wooden box-type structures were removed and replaced with four aluminum 48" flap gate stop-log structures. These structures will facilitate the management for waterfowl in Lake 5. Also, the structure located in the southwest corner of Lake 4 was relocated due to an oil/gas well location. The majority of the cost of relocating this structure was paid for by Pennzoil Oil and Gas Company.

Two additional structures were installed on the south side of Lake 3 in order to facilitate the management of this unit. These structures, 48" aluminum gates with a stop-log arrangement, were installed by Refuge personnel and equipment. A ditching system was established in Lake 3 which will improve water control of this impoundment.

The Rockefeller spud barge was in need of repair and during the past year was taken to the shipyard for major repairs. The hull was sand blasted, repaired and painted.

The East End Locks, the largest water control structure on the Refuge, received minor repairs during the past year. The ram which operates the south gate was replaced. Further inspection indicated this structure was in immediate need of major repairs. Along with the assistance of personnel from the DOTD, drawings and estimated cost figures were prepared. A capital outlay project covering the renovation of this structure has been submitted.

Several capital outlay projects are in various stages of completion at Rockefeller Refuge. A portion of Project No. 16-01-00-82-12 was rebid in 1986 and all bids were rejected because they were over the budget allocation. The money was then used by Louisiana Department of Wildlife and Fisheries to purchase materials for Fur and Refuge personnel to rebuild the structure in that project.

Project No. 16-02-00-83-2 was awarded and ninety percent completed in 1986. The contractor has completed major repairs on the Big and Little Constance control structures and the Royalite Canal plug. Two new aluminum automatic water release structures were installed in Unit 6 to allow removal of excess water from that important alligator nesting study area. Also, a new weir was completed on the west fork of Rollover Bayou and another weir on Pigeon Bayou should be completed in early 1987.

Project No. 16-02-00-84-3 was designed to rebuild 45 miles of levee on Rockefeller Refuge. The design phase

was completed in mid-1986 and bids accepted in October. The low bidder was within the allocated budget on the project including all alternates. This project will restore many levees on Rockefeller to design levels and continue to allow management strategies which enhance marsh productivity. The contractor was awarded the project and construction will begin in early 1987.

Project No. 16-02-00-85-1 is the restoration and maintenance of facilities at the headquarters area. This project was reviewed and revised in 1986 and is in the design and review stage. This project will be bid and construction will begin in 1987.

Marsh Island Wildlife Refuge

Marsh Island Wildlife Refuge, located in Iberia Parish, contains approximately 78,000 acres of brackish marshlands. Marsh Island annually provides wintering habitat for thousands of ducks, geese and other birds. Additionally, nutria, muskrat, mink, river otter, raccoon, mottled ducks and alligators are abundant year-round residents.

During 1986, an extensive renovation project was undertaken at the headquarters facility. The following work was completed: (1) installed a new roof, (2) closed in porch and expanded the kitchen, (3) installed vinyl flooring and carpeting, (4) constructed a new bathroom and remodeled an existing bathroom, (5) installed a central air conditioning and heating unit, (6) installed insulated windows and new doors and (7) constructed a 12' x 16' utility room under main camp. Other work activities at the headquarters site included dredging of boat slips, installation of gutters on boatshed and purchase of a "Marsh Island Wildlife Refuge" sign. Maintenance and repairs to existing trapping camps and boating equipment was done periodically throughout 1986. A new 21' aluminum patrol boat was purchased for enforcement work on Marsh Island and its surrounding waters.

In cooperation with Ducks Unlimited, Inc., extensive repairs were made on the 8,000 acre fresh-water impoundment on Marsh Island. Approximately 15,000 linear feet of levee was rebuilt and 2 new water control structures (each consisting of 8 - 48" flap-gated culverts) were installed. These new water control structures will allow management independently of 2 - 4000 acre impoundment units. Historically, the impoundment has provided habitat for thousands of wintering teal, mallards, and pintails. The impoundment provides increased habitat diversity, thereby enhancing overall productivity on Marsh Island.

Active habitat and resource management on Marsh Island during 1986 included: (1) Controlled marsh burning was conducted during the fall of 1986 to promote the growth of three-corner grass.

(2) Establishment of a fur harvest program for the 1986-87 trapping season. Six groups of trappers were assigned units and have harvested approximately 4000 nutria during December, 1986.

(3) Erosion at one weir site was controlled by placement of dirt fill and reef shell.

(4) Monitoring of environmental parameters (water levels, water salinity, temperature and rainfall) is conducted on a daily or weekly basis.

(5) Inventory of all avian species utilizing Marsh Island Refuge began in March 1986 and will continue until April, 1987.

Alligator research concerning nest counts, night counts, tagging, growth rates, and telemetry continued during 1986. Additionally, an experimental harvest of alligators was conducted on Marsh Island during the spring and summer months.

In addition to the normal enforcement work of refuge personnel, other activities included: (1) confiscation of approximately 70 gill nets (2) patrolling for out-of-season trawling activities (3) confiscation of crab traps on the refuges and (4) monitoring of harvest of undersize crabs and shrimp in the Vermilion Bay area.

State Wildlife Refuge

State Wildlife Refuge, located on the western shore of Vermilion Bay, in Vermilion Parish, comprises 13,000 acres of brackish marsh habitat. Management of this refuge is directed toward providing winter habitat for ducks and geese. State Wildlife annually winters snow goose populations that may exceed 100,000 birds.

During 1986, maintenance activities were centered at the headquarters facility located on Bayou Fearman. Routine maintenance (washing, sanding and painting) was done on the main camp, boatshed, tool shop and tractor shed. Construction of a new marsh buggy and tractor shed was completed during 1986. Painting and console repairs were done on two patrol boats used for inside waters. New refuge signs were placed along the entire State Wildlife boundary line. All main entrance ways to the refuge and weir sites were marked with new signs listing the refuge's rules and regulations. Plans were finalized during 1986 for a capital outlay project involving several water control structures and bulkheading projects. Actual construction was begun in January 1987.

Control burning on the refuge was delayed during the fall of 1986 due to inclement weather. However, a significant portion of the refuge was burned by December 1986. Extensive concentrations of geese have been utilizing the area since early December. Trapping activities on the refuge have centered on expanding muskrat populations during the 1986/87 season.

Enforcement during 1986 involved violations associated with trawling and gill net activity. Approximately 75 boats were rescued and towed to safe harbor during 1986.

Atchafalaya Delta Wildlife Management Area

The Atchafalaya Delta Wildlife Management Area consists of approximately 126,000 acres of shallow water

bays and marshes. Nearly 8,000 acres of the emerging delta have been colonized by vegetative communities. Extensive areas lie just beneath the waters surface, are exposed during periods of low tide and will become vegetated in the near future. Department waterfowl surveys verify that the Atchafalaya Delta provides habitat for thousands of wintering ducks and geese. The area also provides recreational opportunities for hunters, fishermen and bird watchers.

The new headquarters facility was delivered and the utility services were connected during February 1986. The area surrounding the headquarters and a boat slip for the boat "Atchafalaya" were bulkheaded to prevent erosion. A secondary camp (consisting of two 10' x 20' portable buildings mounted on an 8" high platform) was constructed at Wax Lake Outlet to facilitate enforcement activities. The tent camping area was enlarged and new boat docks and mooring sites were constructed for campers and hunters for 1986.

Enforcement activities by Atchafalaya Delta personnel included: (1) patrolling of the extensive management area (2) enforcement of shrimp and gill net laws in surrounding bays (3) enforcement of oyster regulations (4) enforcement of waterfowl regulations both on and off the management area and (5) monitoring of two shell dredges working in Atchafalaya Bay.

Additionally, monitoring of environmental parameters such as tide, rainfall, temperature and water salinity were done on a daily basis. Atchafalaya Delta personnel also assisted researchers from LSU Center for Wetland Resources on a waterfowl and vegetation research project. Approximately 2,000 oaks and 150 cypress trees were planted on a newly created spoil area located southeast of the headquarters. These trees will provide habitat diversity for a variety of wildlife species in future years.

Pass-A-Loutre Wildlife Management Area

The Pass-a-Loutre Wildlife Management Area is composed of 66,000 acres of marshland located at the mouth of the Mississippi River in Plaquemines Parish. The area is extremely productive for waterfowl due to its location at the terminus of the flyway system and production of choice waterfowl food plants. The entire Delta system in which the management area is located has been experiencing significant marsh loss. Due to the extreme marsh loss rates that are occurring in the Mississippi River system, several innovative marsh creation projects have been underway on the management area.

One such project utilizes man-made canals to direct sediments into subsided bay systems. The project shows potential for creating marsh within these open water areas. The project was submitted by the Department in 1983 to the Governor's Coastal Erosion Task Force which confirmed the project and allocated approximately one half-million dollars for construction and scientific study. Construction of the project is presently complete and re-

searchers are now documenting the effectiveness of the silt diversion canals. The canals vary in width from 150-ft. to 400-ft. and are expected to begin building delta islands during the spring floods of 1987.

A second study which is presently underway has also shown promise in the area of marsh creation. This study utilizes synthetic materials to capture sediments which may ultimately be transported into the Gulf and lost to the natural Delta building processes. A pilot project was completed in 1983; an expanded study was initiated in February, 1984. Results of the study indicate that *sediment fencing* has potential for creating marsh in overflow delta systems. Expansion of the concept to the Atchafalaya Delta and investigating potential uses in various wetland systems is presently being planned for 1987.

Water quality stations were set up in 1986 to provide baseline and trend information as to the salinity regime of the management area. An RS5 salinometer is utilized in obtaining salinity, conductivity and temperature data.

The second year of an experimental archery season was completed during 1986. During the 45 day season, 16 deer were harvested and it was estimated that approximately 100 hunter efforts were conducted. Consideration is being given to a permit only hunt for 1987 to gain detailed information concerning hunter efforts and status of the deer herd.

Salvador Wildlife Management Area

The Salvador Wildlife Management Area is located along the northwestern shore of Lake Salvador in St. Charles Parish. The area is comprised of approximately 30,000 acres of fresh and intermediate marsh which produces ideal habitat for waterfowl. A sizeable deer herd is present within this wetland system: natural levees; wax myrtle thickets; and access canal levees create a diversification of habitat which has provided good conditions for the present deer herd. Division biologists have been closely monitoring the increasing deer population on the area.

The second either sex deer harvest was conducted during 1986 for a period of seven days. A total of 232 deer were harvested by 2,571 hunter efforts. The harvest ratio was calculated to be one deer per 11 hunter efforts which appears to be an excellent ratio for a marsh system. Data obtained from the managed hunt will be utilized in conjunction with other information for management decisions for the upcoming 1987 season.

Additionally, during 1986 a research project was initiated to study movement of the floating marsh system of the management area. The project was initiated as a post graduate research project through the Louisiana State University and should be completed during the early part of 1987.

During 1986 the Corps of Engineers in conjunction with the U.S. Fish and Wildlife Service and the Department reviewed the Salvador WMA for potential manage-

ment sites for mitigation associated with a segment of the westbank hurricane protection levee. If the management area is selected as the mitigation site, several marsh management projects or additional land acquisitions may be slatted for the area in the near future.

During the latter part of 1986 materials were received for the construction of two pilot projects utilizing the sediment fencing concept. One project will be constructed along a break in the Lake Salvador shoreline to determine if a "natural plug" can be created utilizing fencing materials. The second project will be located along a major oil and gas canal to determine if the materials will be practical for erosion control. The project will be constructed in the first quarter of 1987.

Water quality stations were set up throughout the management area during 1986 to monitor potential salt water intrusion problems associated with the nearby Barataria Waterway. An RS5 salinometer is being utilized to monitor salinity, conductivity and temperature on a bimonthly basis.

Pointe-au-Chien Wildlife Management Area

The Pointe-au-Chien Wildlife Management Area is comprised of approximately 30,000 acres of marshland. Marsh types vary from nearly fresh to brackish. The area provides habitat for waterfowl but is gradually changing to a more saline environment which is more conducive to marine organisms. In addition to increased salinities, the area has experienced extreme marsh loss rates in relatively recent years. Factors which have influenced this deterioration trend include but not limited to saltwater intrusion, canalization, reduction in fresh water and sediment influx, subsidence, extreme tidal fluctuation, erosion, and a rise in sea level. The following projects have been proposed to offset this significant marsh deterioration process:

The Montegut Project will place approximately 3500 acres of wetlands under management. The project is located southeasterly of Montegut between two natural ridge systems formed by Bayou Terrebonne and Bayou St. Jean Charles. Approximately 4.5 miles of levees and (3) 50-ft. fixed crest weirs will place this wetland system under management and ultimately enhance wildlife and fishery resources of the area. During 1983 the project was proposed to the Governor's Coastal Erosion Task Force. In mid-1986 the project was let for bids. All bids received were above the proposed funding level. Presently the project is being revised and will be rebid during 1987.

The Grand Bayou Project encompasses approximately 4500 acres of wetlands located immediately west of Grand Bayou and Cutoff Canal. Similar to the Montegut and St. Jean Charles Projects, the area has experienced significant wetland loss. The project proposes approximately seven miles of levee system with three fixed crest weir structures. The U.S. Fish and Wildlife Service in co-

ordination with our Department has submitted the project to the Corps of Engineers as potential mitigation for the Larose to Golden Meadow Hurricane Protection Levee. Two of the three weir structures have been completed by the Department and approximately two miles of levee and numerous plugs within the system. A final report is in the process of completion by the Corps of Engineers which hopefully will clear the path for construction of the remainder of the project. A conditional approval was granted by the Corps of Engineers during the latter part of 1986.

The Bully Camp is located west of the Bully Camp Oil and Gas Field and is bordered entirely by petroleum access canals. The area encompasses approximately 1000 acres.

Hurricane Juan in 1985 damaged a large portion of the levee system of this unit. It appears that FEMA will supply funds to rebuild the unit in early 1987. Upon rebuilding the levee system, two water control structures and one earthen plug will be required to place the unit under management.

Water quality stations have also been set up throughout the Pointe-au-Chien area, salinity stations will aid the Department in monitoring saltwater intrusion and the effectiveness of the above management techniques on the area.

Maintenance Section

The maintenance section started the year by restoring facilities damaged by Hurricane Juan and progressed into projects as previously scheduled. At Pointe-Au-Chien, remodeling of the office and living quarters at the main camp was completed. All of the interior was damaged by the flood waters causing all paneling, insulation, ceiling tile and flooring to be removed and replaced. Attention was then focused to Pass-A-Loutre Wildlife Management Area. The loading and landing docks were replaced, the slip from Johnson Bayou to the landing was dredged and the levees were cleaned and levelled. A new sewer treatment plant was also installed. Division personnel completed construction of the 800 sq. ft. laboratory at the New Iberia field office. The laboratory facility is currently being used for alligator and furbearer necropsy research. The Seafood Division is also utilizing the laboratory for shrimp and finfish research. In Baton Rouge, the division's Bay in the new storage building was improved by adding rooms for files, equipment, clothing and dividing these areas to better utilize the limited space available.

Hurricane Juan also caused considerable damage at Salvador Wildlife Management Area. Extensive repairs were made on the headquarters building including major roof repairs which entailed replacing rafters, removing and replacing the sheeting and shingles on the roof, new guttering, replacing and exterior paneling, rescreening the front porch, and painting all of the exterior. A major part

of the plumbing under the camp was reworked and a new sewer treatment plant was installed behind the on-site residence. Also, new flooring was installed in both the headquarters building and the residence.

At Marsh Island Refuge headquarters a major remodeling project was undertaken to give the facility a much needed facelift. Maintenance personnel began by re-roofing the facility with metal, then installing a new central air conditioning and heating system. The rear porch was converted into a storage room with built in lockers and into an extension of the dining room by removing a wall. An additional bath with showers and other facilities was constructed, ceiling tile was replaced throughout, and the wooden windows were replaced with energy efficient insulated windows. All the interior was repainted, the living room repaneled, and the kitchen remodeled. At the downstairs entrance, a screen porch was added as well as a new sewer treatment plant. The year 1986 was ended at Pointe-Au-Chien where the bridge and its apron were strengthened with new sheet piles and concrete. A large hurricane ramp was constructed for protection of equipment from future storms.

RESEARCH

The Fur and Refuge Division's research program is managed by three biologists stationed in North Louisiana, nine biologists in coastal Louisiana, and a number of non-technical support personnel. Programs of research responsibility included statewide alligator research and harvest, statewide fur research and management, research directed toward marsh enhancement, marsh ecological monitoring, alligator farm research, statewide alligator farm extension service, Canada geese and brown pelican conservation programs, estuarine fisheries research, pond culture studies and, very importantly, research directed towards conservation of Division managed property. The dissemination of information was an important function of the Fur and Refuge Division during the past year. Scientific information was distributed in the form of lectures to visiting school/university groups, technical writings, symposia presentations, in-service training programs, landowner/farmer extension, department movies, magazine articles, and through the news media. Professional expertise was provided for the implementation of international, federal and state legislation/regulations governing the wise use of alligators and furbearers.

A portion of the striped bass reared in Louisiana's anadromous program were again reared at the Fur and Refuge Division's Rockefeller Refuge. This project resulted in 24,000 fingerling fish being stocked in the Mermentau River and 17,600 in the Calcasieu River during 1986. Since the initiation of the project in 1972, 1,172,011 have been placed in the Calcasieu and 707,973 in the Mermentau River systems from the Rock-

efeller Refuge ponds. Sport fishermen of Southwest Louisiana have reported catching stripers up to 21 pounds in weight as a result of this project.

Growth and movement studies of the commercially important channel and blue catfish were continued during 1986. Fish were captured in slat traps, tagged and released at the capture site in the lower Superior Canal complex on Rockefeller Refuge.

A study completed at Rockefeller comparing slat traps and wire cages for capture of catfish was accepted by the Journal of Management of the American Fishery Society for publication. Wire cages were most effective. Cages caught an average of 2.0 pounds of catfish per trap day; slat traps caught 0.7 pound per trap day. Both gear were highly selective for channel catfish (*Ictalurus punctatus*) even though blue catfish (*I. furcatus*) was the dominant catfish species. Game fish catches in cages were significant.

Continued pond studies with the Malaysian prawn at Rockefeller in 1986 revealed that polyculture with golden shiners was feasible. Stocking of prawn in ponds with this popular bait fish resulted in extra production from the ponds. This study was conducted by LSU Graduate Student, Greg Scott and has been submitted to the Journal of the World Aquaculture Society for publication.

Data on seasonal abundance and distribution of marine organisms in Price Lake (a semi-impoundment) was analyzed and presented at the 1986 Louisiana Academy of Sciences meeting. The study demonstrated that (1) the Price Lake marsh managed by weirs, a form of water management, experienced what appeared to be buffering effect on salinity and depth fluctuations and complete dewatering from low tides, northers, etc., (2) the structures did not prohibit ingress and egress of marine organisms. The initiation of management through placement of weirs or other structures in watersheds of deteriorating productivity should be considered as one of the alternatives to provide for the maintenance and productivity of the coastal ecosystem.

A study began in 1985 comparing the size of channel catfish caught in slat traps and wire cages in the Salvador Wildlife Management Area marshes with those in southwest Louisiana marshes of Rockefeller. Results indicated that the fish in southwest Louisiana were significantly larger ($P < .04$).

A recreational use survey of Rockefeller began during the 1986 calendar year. By the use of road counters and a super cub air craft, data is being assembled.

Some of the most notable research projects conducted by the Fur and Refuge Division have been basic life history studies of the American alligator. Most recently, studies investigating temperature-sex dependence, stress factors, and reproductive biology have added greatly to the general knowledge of the alligator and have benefited alligator/crocodile conservation programs throughout the world. Alligator research projects active during 1986 involved pen culture studies; egg incubation investigations;

controlled environmental chamber culture; specialized laboratory study of blood, bone, and tissue samples; age determination of a group of femur samples; alligator nutrition studies; and the characterization of ecological and environmental factors affecting alligators. The Chinese alligator propagation project was continued during 1986.

Encouraging results were achieved, after years of study, in the development of a dry alligator ration for use in the alligator farming industry. This project, a cooperative effort with Louisiana Department of Wildlife and Fisheries, LSU Medical School personnel and the University of Georgia, demonstrated that alligators fed on a commercial-type ration can grow as well as those fed on nutria.

Louisiana's reintroduced brown pelican colonies produced approximately 1,300 fledglings in 1986. Fifty fledglings were once again moved from Queen Bess Island to Last Island in an effort to establish another new nesting colony and diversify the range of the Brown Pelican in Louisiana. This was the third such transplant and the plans for 1987 are to monitor the new introduction site for nesting activity. In conjunction with Brown Pelican aerial productivity surveys, helicopter surveys were also made for bald eagle nests. Approximately 30 eagle nests were active during 1986.

Again in 1986, the 400 or so Canada goslings produced were allowed to remain with the Rockefeller Refuge flock in an effort to revitalize the breeding nucleus of birds.

An evaluation of marsh management techniques on Rockefeller Refuge was continued in 1986. Vegetative transect data consisting of percent plant composition by species and cover were collected along with water level and salinity data by management unit. These data can then be compared to alligator nest densities, waterfowl use, waterfowl time activity budgets, and other animal-use parameters in order to characterize the productivity of the various management units on Rockefeller Refuge. During 1986, studies were conducted relative to 13 major waterfowl research projects. These studies investigated: breeding and brood rearing activities of mottled ducks; sex ratios, plumages, and pairing chronology of Louisiana non-breeding waterfowl; abundance, diversity and time activity budgets of waterfowl using different types of management units on Rockefeller Refuge; relative abundance of invertebrates by management units on Rockefeller Refuge; an analysis of factors affecting the accuracy of aerial surveys for waterfowl; activity budgets, food habits, and condition of non-breeding green-winged teal in coastal Louisiana; and life history study of lesser scaup wintering in Louisiana. Additionally, preliminary work was begun on a project to investigate the temporal variability in the structure of wading-bird communities.

Fur Research and Management

During 1986, research, data analysis, and report writing continued on projects dealing with nutria, muskrat,

river otter, mink, fox and coyote interactions, alligators, alligator snapping turtles, fur harvest distribution and trap evaluation. Due to the importance of nutria to the state fur industry, our research priority is centered on this animal. In conjunction with Louisiana Tech University, research involving nutria pelt quality analysis and an experimental reintroduction of nutria was conducted during 1986. A thesis entitled "Geographic variation in pelt quality of nutria (*Myocastor coypus*) from coastal Louisiana" was completed in May, 1986. Dorsal and ventral skin weight, dorsal and ventral underfur height, and dorsal fur weight were pelt variables that varied significantly among localities. "Western" nutria pelts were characterized by longer underfur fiber and lighter skin weight than "eastern" nutria. Field research continued on a project entitled "An experimental reintroduction of nutria and subsequent assessment of changes in populations parameters." Approximately 138 nutria were live-captured at Lacassine National Wildlife Refuge in May 1986. Blood chemistry, reproductive status and genetic data were obtained from 28% of these "source" nutria. The remaining animals were released on two sites at State Wildlife Refuge. Monitoring of the nutria populations on these two sites is continuing.

In cooperation with the School of Forestry and Wildlife Management at LSU, two research projects were completed during 1986. A muskrat project entitled "Muskrat reproduction and the effect of tidal flooding in Louisiana" identified peak reproductive activity in early spring with litter counts in lodges and in utero averaging 2.2 and 3.0, respectively. Reproductive activity was inversely related to tidal flooding. A second study entitled "Winter food habits of mink in southern Louisiana" was also completed in August, 1986. The following prey species were identified in order of decreasing importance: crawfish, mammals, fish, reptiles, amphibians, insects and birds.

Field work and data analysis for the fox and coyote telemetry study is ongoing. The main objective of this study is to investigate interspecific competition, movement and activity patterns, and habitat preference of these carnivores.

The annual scent post survey, designed to index bobcat, fox, coyote and raccoon populations, was conducted for the ninth year in 1986. Annual fur harvest distribution in Louisiana was monitored in 1986 with the mandatory fur buyer-dealer reports.

Report writing continued in 1986 for the following research projects: 1) evaluation of the standard and soft-catch leghold traps,

2) river otter density estimates utilizing radioactive isotopes to mark scat.

3) two chapters entitled "Fur management in south-east United States" and "Nutria" are to be published in text book entitled "Wild Furbearer Management and Conservation in North America" by the Ontario Ministry of Natural Resources.

During 1986, an experimental alligator harvest was conducted on Marsh Island Refuge. The objectives were: 1) to evaluate an alternate time of annual alligator harvest with the intent of changing the sex ratio in the harvest, 2) to collect reproductive data to determine the proportion of adult sized females (6' size class) nesting annually, 3) to evaluate the accuracy of calculated optimum harvest rate, 4) to collect femurs from adult sized females and extremely large males to evaluate age at sexual maturity in females and overall age structure in males and 5) to evaluate the logistics of handling and selling whole alligators. A total of 2,929 alligators were harvested. Voluminous amounts of data concerning sex, length, weight, age, reproductive status, size class distribution and location was recorded for each animal harvested. Currently, data is being analyzed and plans formulated for next year's harvest. This experimental harvest has far reaching alligator management implications and represents one of the greatest steps forward in the management of this commercially important natural resource.

An adult female alligator telemetry study was initiated in August 1986 on Marsh Island. Currently 28 alligators have been collared and are being monitored. This research will provide a more complete picture of adult female activities during periods of dormancy, mating and nesting. Post-nesting behavior and hatchling survival can also be determined by monitoring these alligators through the seasons. The Marsh Island alligator food habit study was completed in 1986. Nutria made up the greatest volume of food consumed while crustaceans were the most frequently occurring item in stomachs analyzed.

The Alligator Snapping Turtle (*Macrolemys temminicki*) is currently being researched by state biologists in conjunction with Northeast Louisiana University to determine population status and distribution. Research involving life history and movements were completed in 1986 and a manuscript entitled "A Telemetric Study of Eleven Adult Alligator Snapping Turtles in Northeast Louisiana" is currently being reviewed for publication in 1987. This secretive animal is thought to inhabit all fresh-water bodies in the state. Its habits vary with size, sex and habitat type occupied. This animal generally seeks the seclusion and security of thickly vegetated lakes or deep waters. One-hundred reproductive tracts and stomachs from adult alligator snapping turtles have been collected and are currently being analyzed in order to determine the reproductive potential of this commercial species. Food habits will also be determined through analysis of stomach contents. Greg Linscombe attended one meeting of the Fur Resources Committee of the International Association of Fish and Wildlife Agencies acting as Vice Chairman of that committee. He also made 3 trips to Canada as a liaison of the International Association of Fish and Wildlife Agencies and Louisiana to the Fur Institute of Canada. The Fur Institute of Canada and the Department continued working on improved strate-

gies for cooperative programs to counter international anti-trapping activity. Linscombe also testified, in a New Jersey lawsuit concerning padded jaw traps, in an attempt to salvage the utilization of the leghold trap in New Jersey. The Division has attempted to provide advice and assistance to all states attempting to defend the use of leghold traps, since this loss in other states will impact the fur market and our use of the trap in the near future. Division personnel also attended the Fur Resources Committee meeting of the Southeastern Association of Fish and Wildlife agencies.

Louisiana Natural Heritage Program

The Louisiana Natural Heritage Program is a comprehensive, computer-assisted state ecological inventory. The program was transferred from the Department of Natural Resources July 1, 1986 to the Department of Wildlife and Fisheries and administered by the Fur and Refuge Division. The heritage staff is comprised of a coordinator, botanist, zoologist and a biostatistician. The Nature Conservancy is presently under contract to provide an ecologist to the section. The primary objectives of the Louisiana Natural Heritage Program are

- 1) to gather information systematically and on a continuing basis on the occurrences of significant ecological features of the state including endangered/threatened/rare species habitat, outstanding examples of native ecosystems, and critical areas benefiting the environment;
- 2) to assemble and store this information efficiently in our data management system;
- 3) to make data retrieval utilitarian and cost effective so that the potential impact of various activities on identified lands can be evaluated; and
- 4) to set rational conservation plans.

Information about the status and distribution of rare and endangered species, natural communities, and other special features in the state is collected and stored in a centralized data management system. Map files, manual files, and computer files keep information well-organized and easily accessible. Records are indexed by name, location, status, watershed, and land ownership creating a flexible user-request system. The LNHP provides practical, up-to-date information to public and private policymakers. Applications of the data base have been used in virtually every aspect of biological conservation.

Since July 1, 1986 to date over 400 data requests and permit reviews have been fulfilled including reviews of community development projects, NPDES permits from EPA, U.S. Corps of Engineers permit applications for the entire state, Coastal Management's Division's coastal use permits, as well as, requests from universities, individual citizens, other state agencies, and private conservation organizations.

The Louisiana Natural Heritage Program's data base contains 534 elements in three classes: special plant, special animal, and natural communities. One or more oc-

currences have been identified for 60 percent of these elements. Of the more than 2,000 element occurrences now on file in the data base, over 892 are locations of special plants, 677 special animals, 215 natural communities and 352 are unique features. The data base also includes information on 207 managed areas within the state, as well as, 1165 source abstracts. We have determined that there are no known occurrences for about 78 percent of the element occurrences within the data base. The Louisiana Natural Heritage Program developed the first statewide natural community classification system with seven natural community systems containing 70 distinct communities characterized. The Heritage Program has located high quality examples of 71 percent of the communities with a state rank of 51-53 (endangered-rare). Over 120 sites were surveyed by Heritage staff, scientist on contract, and trained volunteers in the past year focusing on areas and communities in need of field research. The first comprehensive list of rare, endangered, and threatened species of plants and animals was developed by the Louisiana Natural Heritage Program. Of the 3,000 species of vascular plants native to Louisiana, about 280 (9.3%) are rare or warrant further consideration to determine their status. Records of all known localities of 187 of 280 species have been computerized with one-third of these rare plant locations discovered or updated since 1982, and most due to the efforts of the Heritage botanist. The Special Animal list includes 25 mammals (all known occurrences of 21 have been mapped and computerized), 40 herps (268 occurrences of these have been mapped and computerized), 50 birds and 42 species of fish.

The Vertebrate Characterization Abstract (VCA) is a newly incorporated database of the LNHP. The VCA is a record of various attributes of each vertebrate species' taxonomy, phenology, distribution, habitat, food habits, range, activity patterns, reproduction and development, and ecology. In 1986 VCA's were completed for all Louisiana's mammals and fish (298 species). Ultimately, a VCA will be computerized for all 750 vertebrate species of Louisiana. In the two years, the Louisiana Natural Heritage Program has begun an efficient inventory of the state's significant natural areas. As the program moves out of its pilot phase, greater emphasis will be placed on data-user services. The program will broaden its review responsibilities. Data analysis will continue to identify significant natural areas. Greater emphasis will be placed on primary data collection requiring more extensive field investigation.

Resource Management

The Fur and Refuge Division has the responsibility of managing the fur and alligator resources of the state. The division's overall goal is to maintain or improve the resource while allowing optimum utilization.

Fur and Refuge Division personnel continued the mon-

itoring program on the statewide harvest of alligators. During the 1986 season 20,267 tags were issued to 1,207 commercial hunters statewide. These hunters took 19,500 alligators valued at approximately \$3,139,500. Skins were sold primarily to foreign markets in France, Japan, and Italy. One Korean firm purchased 500 skins, the first time this country has entered the Louisiana market.

Along with the sale of skins, alligator meat is processed and channeled into the restaurant trade as well as for home consumption. Over 250,000 pounds of alligator meat (deboned) were sold for human consumption during the 1986 season, about double that for 1985. Louisiana alligator farms produced 4,500 alligator skins and about 25,000 pounds of deboned meat. Value of the meat at the retail level amounted to about 1 1/2 million dollars.

The lack of source for suitable farming stock has severely limited the advancement of alligator farming operations in the United States. The Louisiana Department of Wildlife and Fisheries realized this situation and has provided stock off state-owned lands since 1977. Farmers that qualify for the program, are given hatchling alligators annually until such time as their breeding stock is capable of producing the number of young desired to become a self-sustaining farm. Today, Louisiana has established 15 alligator farms statewide with about 25,000 alligators being housed on these farms. During the 1986 nesting season, approximately 9,000 eggs were hatched in Rockefeller Refuge incubators and these young animals were distributed to the 15 registered farms. Interest in alligator farming is becoming so intense that in 1986, for the first time, eggs were collected on corporate/private property to enable new farms to become established. Sixteen percent of the Rockefeller Refuge hatch came from eggs picked up on non-state owned property.

The Division was represented at the I.U.C.N., Survival Service Commission, Crocodile Specialist Group meeting in Quito, Ecuador. Representation at this conference was important because worldwide management strategies for crocodilians were formulated there. A paper about the population status of the American alligator was also presented at the conference.

A total of 1,051,428 pelts were harvested during the 1985-86 trapping season yielding a net value of \$4.6 million. These figures represent a substantial reduction in both the total pelts harvested and value compared to the previous season. Reduced pelt prices for every species and substantial nutria and muskrat mortality due to Hurricanes Danny and Juan during 1985 combined to reduce the 1985-86 harvest.

During the 1986 Louisiana Legislative session, the Louisiana Department of Wildlife and Fisheries and the Louisiana Trappers and Alligator Hunters Association joined forces to raise the trappers license fee from \$2.00 to \$25.00. In conjunction with the license fee increase, the Governor appointed memberships to the Louisiana Fur and Alligator Advisory Council which is composed of

nine members representing trappers, alligator hunters and coastal landowners and/or land managers. Through funds generated by the trapping and alligator hunting license sales, the Department and the Council will seek to educate the public regarding the utilization of trapping as a sound wildlife management tool and to develop marketing strategies for raw and finished Louisiana fur and alligator products.

Game Division

Land Acquisition

One of the Department's most important activities is an aggressive land acquisition program. During 1986 a total of 3,537 acres were purchased at a cost of \$2,537,795. Land acquisition included Sandy Hollow WMA totalling 3,357 acres and a 180 acre addition to Pomme de Terre WMA. An additional 15,255 acres, purchased by the U. S. Fish and Wildlife Service and adjacent to Sherburne WMA, were added to our WMA system for management purposes.

Our aggressive land acquisition policy has resulted in the purchase of 328,537 acres at a cost of 66.5 million dollars over the past 26 years. All lands, purchased with money from conservationists, are dedicated to public recreational use.

Forestry Section

Habitat improvement through timber sales was carried out this year on Russell Sage, Ouachita, Red River, Sherburne, and Pearl River WMA's. Additional sale areas are being prepared for marketing on these and other Department WMA's for 1987.

Reforestation work continued on Ouachita and Pomme de Terre WMA's with the planting of approximately 1350 more acres (both areas) to desirable bottomland oak species, hickories, native sweet pecan, and cypress. Additional new land on Spring Bayou was partially reforested to desirable oak species. Plans have been established for reforestation of additional farmland acquired on Pomme de Terre at the end of the year and the remaining Anderson Farm acreage on Ouachita WMA.

Statewide acorn collections totalled over 8200 lbs. These acorns are used in direct seeding of some of the farmland acreage on Ouachita and given to the State Nursery at Columbia to custom grow seedlings for reforestation work on Department WMA's.

Supplemental seedling planting was carried out on Russell Sage and Sherburne WMA's to improve the oak composition in timber stands devoid of suitable quantities of hard mast producers.

A survey of timber contractors was made in the spring to update potential timber buyers. Good responses from this survey showed up in more bidder competition for our timber sales and better stumpage prices being paid.

An inventory/test removal of sinker cypress logs was completed on Joyce WMA. The sinkers are there, but getting them out may be too expensive. The Forestry Section was also active in reviewing USFS prescriptions for management of the Kisatchie National Forest. Written recommendations are made after careful review and field inspection of compartments to help improve the wildlife resource on the Kisatchie.

Numerous meetings with the Forest Service were held this year in an effort to once again commence joint management of the Catahoula and Red Dirt National Wildlife Management Preserves, with a total of 70,000 acres.

A cooperative agreement was signed in August that has started a new relationship between the Department and the USFS in regard to wildlife management on the Preserves.

Research Section

The Research Section gathers data on game birds and animals, largely for use in formulating hunting regulations. Separate programs monitor the population status of dove, deer, waterfowl, turkey and upland game birds. Hunters are surveyed by mail as a means of estimating the annual harvest of various game animals and birds.

Doves

Setting dove hunting regulations dominated the attention of the Research Section in 1986. After two consecutive years of afternoon-only hunting, 1986 regulations were changed to include days of both afternoon-only and all-day dove hunting. Specifically, the regulations allowed all-day hunting except on the opening weekend of each season segment when hunting was restricted to afternoons only. This shooting-hours regulation was identical to the 1983 regulation and represented a compromise between the proponents of all-day and afternoon-only dove hunting. Selecting a shooting-hours regulation which will satisfy most of Louisiana's dove hunters remains an elusive goal.

During 1986, the zone line dividing the north and south dove hunting areas was abolished in order to allow a statewide September hunting season. This September season allowed hunters to harvest locally produced doves before they migrated from the areas where they were hatched and raised.

Louisiana's dove nesting population remained stable at a fairly low level in 1986. The size of this nesting population was measured by a count of cooing males in the Spring along a set of predetermined land routes. The 1986 harvest of doves in Louisiana also remained at the

same level as in years past. Thus, it appears that the dove population in Louisiana remains in a healthy state.

Deer

Biological data essential to the state's deer programs were compiled at Wildlife Management Areas during managed hunts open to the public. At 22 major deer areas, biologists gathered data from 2,879 deer taken by 45,027 hunter efforts (or trips).

Veterinary health surveys were conducted in 7 herd areas. One in Claiborne and one in Morehouse Parishes plus two in East Feliciana Parish. In depth studies focused on deer herds of Red River Wildlife Management Area as well as key habitat areas in club lands of Concordia and Union Parishes. These surveys were made in conjunction with the Southeastern Cooperative Wildlife Disease Study.

Other deer work in 1986 included deer range and populations surveys with management guidance provided on 502 clubs participating in the state's Intensive Deer Management Unit program. This is a 289 percent increase in participation since its beginning in 1981. In addition to soaring recreational values, many poor quality deer herds are being improved through sound scientific management on more than 1,400,000 acres currently enrolled in the program.

Waterfowl

Louisiana has approximately 4 million acres of coastal marsh that winter large diverse waterfowl populations. Seven aerial waterfowl inventories of the entire coastal marsh are conducted each winter. Additional surveys are conducted in north central and northeast Louisiana. It is estimated that 5 million waterfowl migrate down the Central and Mississippi Flyways to winter in Louisiana. The mid-winter inventory indicated 3 million waterfowl in the coastal marsh and inland areas of the Mississippi Delta during January of 1986.

Louisiana is associated with the Mississippi Flyway for hunting regulations purposes. The 1986-87 season was the second year the entire Flyway had more restrictive hunting regulations than during the previous 10 years. Preliminary harvest information indicates that the season was moderately successful and comparable to the 1985/86 season.

In 1985/86 102,000 hunters bagged 1.2 million ducks. These figures represent a 16 percent reduction in the number of hunters and a 36 percent reduction in the total duck harvest from 1984-85. The more restrictive hunting regulations and the mild weather conditions of the 1985/86 winter were the primary reasons for these reductions. Species composition was blue-winged teal (23%), mallard (18%), gadwall (10%), green-winged teal (10%), scaup (10%), and wood duck (8%), with pintail, shoveler, wigeon, mottled duck and divers forming the remainder. Additionally approximately 92,000 geese

were harvested during the 1985-86 season. White-fronted geese comprised 45 percent of the harvest with blues and snows accounting for the remainder of the harvest.

Wild Turkey

During 1986, the turkey section's emphasis was on evaluating turkey habitat in North and Central Louisiana. Twenty one areas were inspected and evaluated to determine present turkey populations as well as their potential as possible release sites during the winter of 1987. At present our goal is to restock North and Northwest Louisiana with good strains of eastern wild turkey in hopes of restoring declining turkey populations in this part of the state.

A concerted effort was made to capture turkey during 1986. Success rates were low however with only 44 turkeys being captured and relocated. A combination of an abundant mast crop and bad weather resulted in poorer than normal trapping success.

Telemetry studies were continued with ten turkeys being captured in St. Helena Parish. Nine adult females and 1 adult male were banded, fitted with radio transmitters and released at the trap site. These birds were part of a habitat utilization research project being conducted by Southeastern Louisiana University at Hammond, Louisiana.

Results from the mail out survey for Louisiana's 1985 spring turkey season estimated that 19,700 hunters bagged approximately 6,500 gobblers. This is an indication that restocking programs initiated by this department are continuing to pay dividends with an increased recreational harvest of the wild turkey.

Development Section

Wildlife Management Areas

The Department of Wildlife and Fisheries operates 38 Wildlife Management Areas (WMA's) comprising some 1,107,402 acres of which the department owns in excess of 335,819 acres. During 1986, the landowners of the Cities Services area would not renew the lease agreement; therefore 13,374 acres near Monroe were lost. The Department purchased one new area, Sandy Hollow, a 3,357 acre tract in central Tangipahoa Parish. Acreage was added to other areas. Adjoining Sherburne WMA, the U. S. Fish and Wildlife Service purchased a 15,255 acre tract. The management of these Federal lands is being carried out by the Game division.

In 1986 there were more than one million trips made by the public on Department WMAs. These visitors were seeking the enjoyment of the outdoors in the form of hunting, fishing, camping, hiking, boating, bird watching, picnicking, and other related outdoor activity.

Of the 38 Wildlife Management Areas operated by this Department 34 are managed by the Game Division. They represent every habitat type found in the State: marsh, bottomland hardwoods, cypress-tupelo swamps, mixed pine hardwood, cut over pine lands, pure pines and back-water areas. Major expenditures of time and money are necessary to maintain roads, camping areas, boundaries, bridges, water control structures and other Department facilities on these areas.

As more private woodlands throughout the state become leased for hunting clubs the importance of wildlife management areas is rapidly increasing in furnishing a place for the public to enjoy the outdoors. Popular game species found on most WMA's include deer, squirrel, rabbit, turkey, waterfowl, dove, woodcock, and snipe. For those who enjoy sportfishing bass, bream, catfish and crappie are available. Crawfishing, as a sport, is increasing on many areas that have suitable wetlands within their boundaries.

District Activities

For wildlife management and administrative purposes, the state is divided into eight districts each with a district office, wildlife supervisor, biologists and secretarial staff. Wildlife specialists are assigned to work specific Management Areas and also assist with other projects throughout the district.

On-going district activities include conducting deer range surveys and gathering biological data on other game species. This information is used to develop recommendations that are presented to the commission for the setting of annual hunting seasons. Other routine activities include working on the wildlife management areas, conducting managed hunting and trapping seasons, checking hunter success and improving wildlife habitat. Food and cover is improved by burning in the pine uplands, planting food plots, and closely regulated logging activity on state owned areas.

Considerable time is spent in the winter trapping and releasing turkey on suitable sites across the state. In winter several districts are heavily involved in trapping and banding waterfowl. Assistance is provided to other divisions, on a need basis, in fur and fish related management or research activities. The districts play a valuable part in providing technical assistance to many landowners interested in providing or improving wildlife habitat on their property. Increased interest in Intensive Deer Management also caused increases in time and man power devoted to this popular program by the Game Division. Preparing annual reports, updating long range wildlife management plans and budgeting requires considerable time of the District Supervisor and his staff of biologists.

The District Supervisor of the Game Division, in addition to biological work, is also charged with the entire responsibility for managing the district office. This includes all grounds and building maintenance as well as

janitorial work and repairs. A rapidly increasing work load is undertaken by district secretaries who also provide assistance to the Fish, Fur and Refuge, and I & E Division. Smooth coordination of public information and assistance is often the responsibility of these employees.

The activities of all districts and their staff within the Game Division are coordinated on the state level to provide for better management of the state's wildlife resources.

Upland Game Section

Acres for Wildlife

Enrollment in the "Acres for Wildlife" program in 1986 was 649 cooperators (in excess of 200 of which were hunting clubs with large memberships) and lands in excess of 533,000 acres. Program biologists inspected land, prepared management plans and bulletins, and made presentations to various groups.

Upland Development

Upland game development work on WMA's and private land open to the public by Cooperative Management Agreements continued during 1986. Food plots totalling almost 1,000 acres were planted by section and district personnel. Additional acreage was bushhogged, disced, and control burned by department personnel.

Research and Survey - Quail

Two population surveys were conducted this past year: the wing survey and the fall whistling survey. Hunters participating in the annual wing survey supplied 778 wings to be aged. Sex and age ratio were determined. The statewide fall whistling counts were conducted. Inferences about population conditions were developed based on the combined results of these two survey techniques and general observations made by department personnel during the breeding season.

A statewide bobwhite disease investigation was initiated in 1986. Necropsy and pathology analyses of birds by the LSU School of Veterinary Medicine revealed no significant diseases or parasites.

A four-part research project on bobwhite habitat management was initiated by section personnel in summer of 1986 and will continue thru 1989. A Southeastern/Louisiana State Universities cooperative study was also initiated on LDWF lands with assistance from section personnel. Results of these studies should provide valuable information concerning practical management of pinelands for bobwhites in Louisiana.

Research and Survey - Pheasants

Spring cock pheasant crowing counts were conducted on the Lake Arthur and Sulphur area sites. The Lake Arthur count remained very low while the Sulphur route count was 237 percent above its 1985 value.

One hundred and seventy-eight wild trapped pheasants were obtained in September from the California Game and Fish Department as partial payment for a woodcock exchange that occurred in the mid-1970's. These birds were released on three sites in the same general area as previous releases.

Bait sites were established on the Sulphur site during the winter for the purpose of testing the efficiency of different trap designs. Use of bait sites was sporadic so trapping was not attempted. A nightlighting capture technique was attempted in the fall. It is believed that the population at this time is not sufficiently high for either technique to be particularly successful.

Oaks for Wildlife

Acorns collected by department personnel and the public were delivered to the Office of Forestry nursery in Columbia thus providing about 3,500 seedlings. Some 8,000 additional seedlings were also pulled by department personnel. Hardwood species available were sawtooth oak, obtusa oak and water oak. Approximately 9,200 seedlings were distributed to 46 people with the remaining seedlings being utilized by the department on wildlife management areas.

Heavy Equipment Section

Road repairs and maintenance work were performed on 17 Wildlife Management Areas during the year.

This section did extensive work on Sherburne Wildlife Management Area to complete a shooting range. This work included berms for backstops, road construction, parking areas, and landscaping.

On the Bodcau Wildlife Management Area construction work was started on four and three-eighths miles of new roads. This road will provide access to a portion of the area on the east side that had been practically inaccessible in the past. This road will also provide the benefits of better patrolling for area personnel, increased timber harvest access, and better access for the using public.

On the Manchac Wildlife Management Area a dragline and operator of this section excavated a boat slip for a boat house to be constructed in the near future.

Renovation work was completed on fish ponds at the Monroe and Beechwood Fish Hatcheries.

Maintenance Section

This section did building maintenance, renovation and construction at department owned installations throughout the state.

One important task completed was the shooting ranges at the Sherburne Wildlife Management Area. This complex includes a rifle range, a pistol range, a skeet range with a small pavilion, a combination trap and skeet range with a small pavilion, and a metal storage building. A classroom facility 25' x 60' of metal construction was erected. The frame and exterior of this building was constructed by a contractor and the interior was finished by the Game Division Maintenance Section.

A metal storage building 25' x 40' was erected on Loggy Bayou Wildlife Management Area as well as a 25' x 60' storage building at the Alexandria office.

When the Department purchased the Big Lake Wildlife Management Area it took possession of a camp. Renovation was started on this building to make an overnight facility for personnel to stay while working on the area.

Animal Control Section

During 1986, the Animal Control Section received 376 requests for aid from landowners. Nuisance animals removed at landowner request included 298 beavers, 144 coyotes, 27 foxes, 16 raccoons, 6 skunks and 10 feral dogs. The trapping section also assisted in training numerous landowners in setting traps to control nuisance animals on their land. The Secretary of the Department issued 103 permits to landowners enabling them to control nuisance animals on their land.

Office of Coastal & Marine Resources

Since 1969 fisheries landings in Louisiana have consistently exceeded one (1) billion pounds. In 1986 Louisiana once again led the nation in seafood production with landings of 1.7 billion pounds and a dockside value of \$321.5 million. The Office of Coastal and Marine Resources is the office within the Department of Wildlife and Fisheries charged with managing and regulating Louisiana's marine and estuarine fisheries resources within the framework and policy established by the Louisiana Legislature. This Office is supervised by one of two assistant secretaries within the Department of Wildlife and Fisheries who reports directly to the Secretary.

In 1986 scientists within the Office of Coastal and Marine Resources represented the Department and have taken on leadership roles on numerous gulfwide and national resource management committees and task forces. Scientists within the office have also reviewed and commented on numerous environmental impact statements and fishery management plans developed by the Gulf of Mexico Fishery Management Council and the Gulf States Marine Fisheries Commission.

The Office of Coastal and Marine Resources is composed of the Seafood Division, Ecological and Aviation Sections.

Aviation Section

The Aviation Section plays a vital role in the enforcement of wildlife and fisheries laws and in research and management activities of the Department. The vastness

of Louisiana coastal wetlands, with over seven million acres south of the Intercoastal waterway much of which is not accessible by automobile necessitates travel by air.

Reconnaissance flights greatly increase the effectiveness and efficiency of the Department's enforcement activities. Specifically these flights aid in the location of baited waterfowl ponds, illegal gill nets, purse seining activities, shrimping in closed areas and oyster harvesting from unapproved growing areas. Aircraft also play a supporting role in the apprehension of illegal night hunters and others suspected of violating wildlife and fisheries statutes.

Additionally air support plays a significant role in many of the research and management activities of the Department. Fall and winter waterfowl surveys, fishing effort surveys, oil spill investigations and habitat inspections conducted across Louisiana's marshes would be impossible without air support.

This section also assists during times of emergencies and has played a significant role in evacuating personnel from remote areas in times of natural disasters.

Ecological Studies Section

The Ecological Studies Section is federally funded under the Dingell-Johnson and Pittman-Robertson Acts. Many of the duties and responsibilities of this section are set forth in the technical assistance, research and survey agreement of Federal Aid Project FW-3, the purpose of which is Statewide Environmental Investigations.

Additionally, the Ecological Studies Section administers the Louisiana Natural and Scenic Rivers System. Administration of this system requires that the Scenic Rivers Study Leader investigate and evaluate all applications for activities that take place in or near streams that are included in the system to assure that those activities do not adversely affect the intended uses of the streams in question. If all parameters are met, a permit will be issued to the applicant.

The Section is also responsible for the administration of the Fill Material Permitting Process and Seismic Permits. Companies who dredge fill material from State owned water-bottoms are required to secure a permit from this Department and pay a royalty set by the Commission.

Seismographic exploration, the measuring of shock waves created by discharging an energy source, is the tool used by the oil and gas industry in its exploration activities to locate potential petroleum reserves. Research has indicated some seismographic activities may adversely impact the fish and wildlife resources of the state. In order to effectively monitor these activities, a regulatory process was established and is administered within the Office of Coastal & Marine Resources.

Seismic companies operating within the state must first obtain a permit from the Department. Seismic agents employed by the Department are assigned to each field operation and prepare weekly reports on the seismic companies' operations. These reports include information on the activities of the companies' survey crews, the discharge of explosives or other energy sources used to create the shock waves, and daily records on the number of charges fired, depth fired and impact on habitat and fish and wildlife resources.

In 1986 fifty crews were permitted work in the state. The seismic section is in the process of increasing the fees collected for seismic agents from \$115.00 per day to \$135.00 per day for days crews work. Due to a slow down in oil production and related work there was a lay-off of twenty-two employees from the Seismic Section.

During 1986 the Ecological Studies Section accomplished the following tasks:

1. Technical assistance in matters pertaining to fish and wildlife conservation and habitat assessment, preservation, mitigation and compensation was rendered to the U.S. Army Corps of Engineers. This assistance was rendered during the early planning stages of several major water resource projects.
2. Technical assistance was given to the Soil Conservation Service (SCS) and U.S. Forest Service concerning native fish and wildlife species and the potential effects that actions of these two agencies could have on those species. The types of projects addressed and considered were watershed projects by SCS and land use and land management programs of the Forest Service.

3. Several other federal, state and local agencies as well as private individuals and companies received technical assistance. The assistance was rendered either through direct one-on-one contact or via service on committees, task forces or advisory panels.
4. Personnel of the Ecological Studies Section were involved in the review of several types of state and federal permits. These included U.S. Army Section 10 and 404 permits, state coastal use permits, NPDES permits from EPA or DEA, solid waste permits and hazardous waste permits. Additionally this section provided evaluation of projects authorized under the Statewide Flood Control Program, Community Development Block Grants, airport construction grants from FAA, and endangered species consultation.
5. During 1986 this section reviewed 15 Scenic Rivers Applications, issued 12 permits, denying none. Three are still being reviewed.
6. The section also revised and developed a permitting system in lieu of a contractual system for the regulation of fill material dredging and royalty collection. During the year 8 fill material permits were issued and royalties were collected amounting to \$344,385.00

Seafood Division

The Seafood Division is the largest program within the Office of Coastal and Marine Resources. During 1986 efforts were made to streamline operations of the Division as the Fish Kill Section was merged into the Finfish Management Section and the Seismic Section was merged into the Ecological Studies Section directly under the Office of Coastal & Marine Resources.

Personnel within the Seafood Division serve as technical advisors and represent the Department on numerous national, gulfwide and state fisheries management organizations, i.e. the Gulf of Mexico Fishery Management Council, Gulf States Marine Fisheries Commission, MARFIN, Lake Pontchartrain Task Force, Task Force on Shrimp Management, the Seafood Promotion and Marketing Board, the Governors Economic Recovery Council, the Legislative Task Force on Underwater Obstructions and others.

Administrative Section

The Administrative Section controls the fiscal, personnel and policy functions for the Division as well as coordinating fisheries research, monitoring and management activities. This section also administers and issues per-

mits to persons engaged in various activities. During 1986, 127 Scientific Collecting Permits were issued to scientists to collect marine and estuarine fish and invertebrates for research and education; 25 Special Bait Shrimp permits were issued in accordance with R.S. 56:497; 47 experimental permits were issued in accordance with R.S. 56:571; and 18 pompano permits were issued in accordance with R.S. 56:406.

Fisheries Management Section

Shrimp

Preliminary landings statistics released by NMFS indicate 1986 was by far the best shrimp production year thus far for Louisiana. More than 89.6 million pounds (heads-off weight) of shrimp were landed at Louisiana docks in 1986; this compares to the 74.2 million pounds landed in 1985 and the 71.3 million pounds landed in 1981 - the previous record years.

Spring discharge rates of the Mississippi River were generally lower than those of 1985. River discharge, which significantly affects both the temperature and salinity of Louisiana coastal waters, is a major factor influencing brown shrimp production. April discharge (547,000 cubic feet per second) was lower than either the long term April average (618,000 cfs) or the 1985 April discharge (924,000 cfs).

Spring rainfall is another parameter closely linked to brown shrimp production. As with river discharge, rainfall shows an inverse relationship to shrimp production by affecting the salinity of coastal waters. The cumulative rainfall total recorded through April (11.21 inches) was far below that recorded in 1985 (18.5 inches) or the long term average (19.4 inches). This lack of rainfall, combined with the low Mississippi River discharge, served to increase the number of estuarine acres with salinity in excess of 10 ppt (considered optimum for brown shrimp production) to 2.5 million. This figure compares to 1.8 million acres in 1985. Monthly rainfall remained near or below the long term average for all of 1986. By December 1986, cumulative rainfall had reached 51.11 inches, compared to 66.6 inches in 1985 and the long term average of 62.5 inches.

Water temperature also plays a role in shrimp production. In particular, the number of hours water temperature is below 20 degrees Celsius after April 8 exhibits an inverse relationship to brown shrimp postlarval (pl) growth and survival. The 1986 value of 7 hours was the best for production since 1981 when a value of 0 hours was recorded.

In toto, the various hydrological parameters combined to provide an excellent framework for shrimp growth and survival in the estuaries.

Louisiana's offshore territorial waters were closed by Commission action from 12:01 a.m. January 15 to 12:00

Midnight March 15. The annual closure was established by the 1984 Louisiana Legislature as a means of protecting small, overwintering white shrimp returning to the estuaries to complete their growth phase. It was believed this would increase both white shrimp production and value by eliminating waste of small shrimp while allowing a catch of larger, more valuable shrimp at a slightly later date.

In the Barataria Bay drainage, historically one of the first areas to experience brown shrimp postlarvae recruitment, the first pl's were caught the first week of February in 1986. The number of pl's caught remained low, when compared to past years, throughout the spring. The major immigrations occurred in the last part of February and first part of March, a period of full moon phase. Recruitment in Zone 2 (the central Louisiana coast from the Mississippi River to Vermilion Bay) preceded that of either Zone 1 (coastal Louisiana east of the Mississippi River) or Zone 3 (coastal Louisiana west of Vermilion Bay). Again, the magnitude of postlarval catch is not a good indication of future production, the timing of the recruitment and the environmental conditions on the nursery grounds play a much more significant role in survival and growth.

When 6' trawl sampling was initiated in April, all Coastal Study Areas (CSA) reported juvenile brown shrimp present on the nursery grounds. At that time, Zone 2, as is the normal pattern, led in both catch per unit effort (CPUE) and average size. CSA's III and VI both showed increased CPUE when compared to 1985. All other CSA's had reduced catch. By the last week in April and first week in May, Vermilion Bay, usually a poor brown shrimp producing area, was yielding CPUE's of more than 150 juvenile brown shrimp per 10 minute 6' trawl sample and Calcasieu Lake sample catches were at record levels (1069 per 16' trawl tow). It should be noted that the high salinities and lack of rainfall allowed the shrimp to disperse over a much larger area than normal and outside of the usual sampling zones. Overwintering white shrimp were present with CPUE's of up to 18.62 (CSA-VI). Average sizes were between 93.02 mm (CSA-VI) and 120.56 mm (CSA-III).

By applying a standard growth factor of 1.5 mm per day to the brown shrimp population data collected with the 6' trawls, it was projected more than 50% of the available brown shrimp crop would cross the 100 shrimp per pound (count) mark by May 19 in Zones 1 and 2 with Zone 3 behind by only a few days. The Department, therefore, recommended to the Commission that the spring shrimp season open coastwide at 6:00 a.m. on May 19. At the May 1 - 2 Commission meeting in Kenner, most speakers concurred and the Commission voted to affirm this recommendation.

Although hydrological parameters remained well within acceptable ranges for shrimp survival, the passage of several cold fronts in the last half of April, dropped air temperatures to near record levels, depressed water tem-

peratures and slowed shrimp growth. This was offset somewhat by significantly increased water temperatures between May 2 and 19.

Between the May 2 Commission meeting and opening day, Zone 1 pl recruitment and juvenile average size both increased, particularly in the area north of the Mississippi River-Gulf Outlet (MR-GO). During the week of May 12 anomalous outgoing, night tides triggered movement of a portion of the brown shrimp population in Zone 2 to the offshore waters. Finally, between May 15 and 18, an approaching cold front caused strong south and southeasterly winds and raising tides, which shifted and further dispersed the shrimp population.

The strong southerly winds continued opening day. This caused rough sea conditions in the larger inland lakes and bays which, along with a weather forecast for thunderstorms, discouraged many fishermen from trying their luck. Those who did stayed mainly in the bayous and smaller lakes.

On opening day in Zone 1, recreational catches varied considerably. Average was about 100 pounds per boat, slightly better than that observed in 1985. Average size was similar to 1985 with the bulk of the catch in the 60/70 count (heads-on) range. Commercial catch north of the MR-GO was generally in the 200-300 pound range, predominately 50/60 count. South of the MR-GO, commercial fishermen fared better catching an average of 700 pounds of shrimp ranging from 40/50 to 70/80 count, with the smaller shrimp coming from the more inland waters.

Zone 2 can be divided into two areas - the area east of Bayou Grand Caillou and the area west of Bayou Grand Caillou. In the eastern section of Zone 2, brown shrimp predominated the catch. Sizes ranged from 21/25 to 80/100 count with the majority of the catch in the 50/60 and 60/70 size groups. Recreational fishermen averaged about 100 pounds while commercial people brought in 800 to 1400 pounds per boat. White shrimp predominated the catch in the western part of Zone 2. Sizes were in the 10/15 and 26/30 count groups. Commercial catches were generally 500 to 600 pounds while sports caught about 100 pounds of whites with some 100+ count browns mixed in.

In Zone 3, commercial fishermen averaged 500 pounds of 80/100 count brown shrimp and 250 pounds of 10/15 through 21/25 count white shrimp. Recreational fishermen averaged 75 pounds of 100 count brown shrimp and 25 pounds of 16/20 and 21/25 count white shrimp.

Preliminary NMFS landing statistics indicate 17.9 million pounds of shrimp (heads-off) were brought to Louisiana docks in May, up from 15.1 million pounds in 1985. Total Louisiana landings from January to the end of May were up nearly 3 million pounds from 1985, with respective values of 24.7 million and 22.0 million pounds recorded.

While hydrological conditions remained good, catches remained good and prices stayed high, an unusually early

influx of white shrimp juveniles forced the closure of the spring season in part of Zone 2 (from the east bank of Bayou Lafourche to the western shore of Vermilion Bay) at midnight June 30 pursuant to R.S. 56:497 which states the spring season shall remain open "... a minimum of fifty days or until technical data indicates the need for closure to protect the forthcoming white shrimp population ...". At that time landings had reached 39.0 million pounds and were 3.5 million pounds ahead of 1985 (35.5 million pounds).

The remainder of Zone 2 and Zone 3 closed at midnight July 3rd, again to protect the upcoming white shrimp crop. Zone 1, with the exception of Breton and Chandeleur Sounds, closed midnight July 25. Breton and Chandeleur Sounds were allowed to remain open until the onset of the fall season to harvest a crop of large brown shrimp. Catches in the area during the extension were averaging 100 to 250 pounds per boat of 10/15 and 16/20 count browns.

Between seasons, salinities and temperatures remained favorable for shrimp production. Persistent northwest and west winds during July, however, kept tidal levels below normal for most of the month and apparently contributed to a significant movement of juvenile white shrimp to the offshore waters.

Juvenile white shrimp recruitment began during the second week of June west of the Mississippi River with peak numbers reported during the first week of July. As mentioned above, significant offshore movement of juvenile white shrimp occurred during the second and third weeks of July in all CSA's west of the Mississippi River. This emigration was reflected in changes in the composition of commercial catch taken along the beach. In June most of the white shrimp landed were large and brought in headless. After the second week of July most were about 70 count and landed heads-on.

The last week of July and first week of August saw a virtually complete emigration of white shrimp from Calcasieu Lake. Trawl samples (16') taken the last week of July had a CPUE of 207. By the second week of August the CPUE had dropped to 5. Shrimp buyers in the Cameron and Hackberry areas reported buying approximately 800,000 pounds of 81-100 count white shrimp from wingnetters in the Calcasieu system during the tidal movement associated with the full moon in July. The next week, opening day reports for the fall season in this area indicated effort was below normal and catches were described as "extremely poor".

As mandated by law (R.S. 56:497A.), the fall season opened 12:01 a.m. Monday, August 18. Opening day catches east of Bayou Lafourche and west of Vermilion Bay were below normal and sporadic. In contrast, catches in the central part of the state were generally good. Recreational catch averaged from 100 pounds south of Cocodrie to 180 pounds in Vermilion Bay. Most of these shrimp were in the 40/50 and 36/40 count groups. Commercial fishermen averaged about 1000

pounds of 36/40 shrimp with large quantities of 26/30 and 31/35 shrimp mixed in. By the end of the first week, as is the normal pattern, catches had begun to decline. Study Leaders for the CSA's east of the Mississippi indicated good numbers of large brown shrimp were present at the fall opening. August landings (9.6 million pounds) were 4 million pounds greater than 1985 (5.7 million pounds).

Mean water temperatures remained above 20 degrees C into December, upper marsh salinities stayed above normal, rainfall remained low, shrimp numbers and sizes remained high and prices continued at good levels throughout the fall season. The season was closed 21 December as required by law (R.S. 56:497A).

A special season was scheduled in Zone 1 to run from 12:01 a.m. December 22 1986 to 12:00 p.m. midnight January 14 1987. This season was set to allow fishermen to harvest a crop of large, late emigrating white shrimp. Trawling efforts were largely unsuccessful though some wingnetters brought in up to 100 pounds of 40/50 to 50/60 shrimp per night.

The number of commercial shrimping licenses sold actually declined in 1986. The 1986 value of 20,802 represented the fewest commercial shrimpers since 1980. The number of recreational licenses (17,417), on the other hand, set a new record.

Management and Research

In 1986 this section maintained a vigorous shrimp monitoring program. Biological information on the distribution, density and average size of shrimp, blue crabs and bottom fish was collected at 109 stations across Louisiana in inshore waters as well as Louisiana's offshore waters west of the Mississippi River. Hydrological readings were also taken each time a biological sample was collected. Other data which influence those biological populations such as Mississippi River discharge rates and coastal rainfall accumulations were collected and analyzed. In 1986 information from these monitoring activities was entered directly into the computer (P.C.) using newly developed data entry techniques for the P.C.

Data from these monitoring activities was used to formulate Department recommendations for opening and closing the spring shrimp season as well as a special shrimp season east of the Mississippi River following the regular fall season. Data from this monitoring program was also used to evaluate shrimp populations shifts, i.e. the early offshore emigration of white shrimp in the western portion of Louisiana during late July and early August as well as long term trends in shrimp populations in Louisiana waters.

Blue Crab Research

The use of escape rings in crab traps to reduce the catch of small crabs was evaluated in 1986. Several different experiments were conducted to evaluate different

ring sizes ($2\frac{1}{4}$ " , $2\frac{3}{8}$ " , $2\frac{1}{2}$ "), ring locations, and number of rings. Preliminary data suggests that the $2\frac{1}{2}$ " ring was best in reducing the catch of sublegal (less than 5 inches in length point to point) size blue crabs. Sublegal catch in traps with $2\frac{1}{2}$ " rings was reduced 65% and 72% from control levels in two different experiments. The number of legal crabs was roughly equal in the control traps and traps with $2\frac{1}{2}$ " rings; however, weight of legal crabs increased 5.5% and 2.9% in the traps with $2\frac{1}{2}$ " rings because of the larger average size of crabs in the experimental traps as compared to the control traps. Preliminary data from an experiment evaluating ring location (corner flush with the floor, mid-trap flush with floor, upper mid portion of trap) suggests that traps with rings located flush with the floor, either in the corners or in the middle, produced the best results. From control levels, sublegal catch was reduced 77%-78% while the legal catch increased 7.0 and 7.7%. Data from the experiment evaluating ring number was inconclusive. The use of escape rings in crab traps as a management measure appears very promising. Research is continuing on the use of escape rings.

The impact of ghost traps was also evaluated in 1986. Many crab traps are abandoned or lost every year. These "ghost" or derelict traps continue fishing for an undetermined length of time. Twenty-five traps were baited once and then checked weekly. All crabs were tagged and measured and returned to the trap. Fiberglass screens were placed on the bottom of the trap to prevent tags from falling through the bottom of the trap. Three months of preliminary data collected during 1986 shows an average of 12.8 crabs per trap were initially attracted to the bait; after the initial bait was gone an average of 9.8 crabs were recruited to each trap. Recruitment of new crabs decreased as the total number of crabs in the traps decreased and the water temperature dropped. An average of 14.3 crabs died and 7.1 crabs escaped from each trap. The total number of crabs in the traps declined steadily from 12.8 to 2.7 due to escapement, mortality and decreased recruitment of new crabs. Crabs that escaped from the traps stayed an average of 14.7 days while crabs dying in the traps lived an average of 16.4 days. Length frequency data showed that the smaller crabs were more likely to escape from the traps than the larger crabs.

Menhaden Forecast

Meetings are held every year with menhaden industry personnel prior to the opening of the menhaden season to present catch forecasts and to discuss other matters relative to the menhaden industry.

Models for predicting commercial catches of gulf menhaden have been developed by Guillory and Bejarano (1980) and Guillory, Geaghan, and Roussel (1983). These predictive models are based on abundance of juvenile menhaden taken in the shrimp monitoring trawl samples the previous year and on hydrological/climato-

logical data such as salinity, temperature, river discharge, wind direction, and tides, also from the previous year. Catch per effort of age-1 menhaden is predicted. Since age-1 menhaden normally comprise 90% and 67% of the catch in western and central Louisiana, the age-1 forecast also reflects on total catch.

In addition to the above models, optimum hydrological/climatological conditions have been identified for the critical early life history stages, usually sometime during the December to March time frame. Relatively cold, dry winters are associated with good recruitment of age-1 menhaden into the fishery the following year. The cold, dry winter is characterized not only by low temperatures and low rainfall but also by low tide levels, low Mississippi River discharge, high salinity, low wind speeds, and low incidence of southeast winds.

Catch per effort forecasts generated by the two predictive models, as well as general hydrological/climatological conditions, indicated that a very weak year class of age-1 fish would be entering the menhaden fishery in 1986. No 1986 catch per effort data is available, but preliminary data by NMFS revealed that age-1 fish comprised only about 33% of the catch. This suggests a very weak age-1 year class, as age-1 fish normally comprise approximately two-thirds of the entire catch.

In 1986, the menhaden catch in the Gulf of Mexico was approximately 824,500 metric tons, or 1,818,000,000 pounds.

Oysters

A number of oyster leases were examined during January and February of 1986 for the possibility of damages caused by Hurricane Juan. Most of the 52 leases located in upper Plaquemines and St. Bernard Parishes were suffering from overburdens of sediments in association with varying amounts of vegetation and organic matter. These leases were located in bays and lakes rather than bayous.

Due to a combination of heavy fishing pressure during the previous season, adverse climatological conditions, and pollution, the 1986-87 season was the poorest oyster harvest since 1966. Salinity, the prime determining factor for oyster production, was extremely high statewide due to drought conditions and low river discharges. Salinities were too high for production in normally high production areas, while areas normally low in salinities came into production, i.e., Vermilion/Atchafalaya Bays.

Seed oyster production for the 1986-87 season will total approximately 140,000 barrels with most of this production from Sister Lake and Vermilion/Atchafalaya Bays.

Market oyster production for the 1986-87 season will total approximately 327,000 sacks, off 40% from last year. With the supply down and the demand up, oystermen received high prices for their product (as high as \$21.00 per sack).

Recognizing the past and present need for freshwater diversion, the Seafood Division of the Department of

Wildlife and Fisheries has made necessary repairs/restorations to the Bayou Lamoque freshwater diversion structures, and placed them into operation in an attempt to stimulate primary production within the ecological food chain in California Bay and adjacent areas. By the introduction of nutrients via the diverted freshwater, the resulting increase in plankton production will stimulate the production of all fisheries resources including oysters.

The seed oyster production for the 1987 season will depend primarily on normalizing salinities. Although a general spat set was observed throughout the month of September, these oysters may not survive unless salinities decrease.

A State funded shellplant was conducted in Coastal Study Area II during May of 1986. Clam shell consisting of 25,000 cubic yards was sprayed at a rate of 50 cubic yards per acre over 500 acres in Black Bay and Bella Pass. These shellplants were examined in June, and spat were observed on the shell. Also, a general spat set in September caught on these shellplants, and seed oyster production is expected. This should provide improved environmental conditions.

Oysters were transferred from polluted and otherwise undesirable areas in Calcasieu Lake to more suitable areas in May, 1986. A transfer of 33,000 sacks to a suitable area of West Cove augmented the current stock resulting in the production of over 50,000 sacks of market oysters.

In 1983, House Concurrent Resolution 93 created the Oyster Management Task Force to advise and assist the State Health Officer on issues pertaining to the classification of oyster growing areas. This task force consists of members from the Senate, House of Representatives, Police Juries Association, Department of Health and Human Resources, Department of Wildlife and Fisheries, and representatives of the oyster industry. Within this task force are three subcommittees: Appeals, Legislative and Information, and Enforcement. Members of the Department of Wildlife and Fisheries serve on all three subcommittees.

Survey Section

The Drafting Department worked on closures of monument traverses and lease surveys from private and department surveyors, telephone information calls, typing, filing, record keeping and collections, as well as assisting oil company and seismic representatives.

Survey fees collected	\$201,028.95
Rentals collected	535,147.72
Leases issued & processed	616

Total field activity to December 31, 1986	
Applications for survey scheduled	1582
Applications surveyed	1138
Applications not surveyed due to bad weather conditions & low tide	415

The Survey section supervised a limited lifting of the oyster lease moratorium during which 350 applications for new areas were taken. The rules for an auction of delinquent oyster leases were finalized and approved during 1986. The Survey section also performed the preliminary construction surveys for the new building at Quail Dr.

Lyle S. St. Amant Marine Laboratory

The primary function of the Lyle S. St. Amant Marine Laboratory is to conduct applied research for the betterment of Louisiana's seafood resources. Problem-specific studies as well as extensive monitoring programs are designed by the research staff who in turn are responsible for interpretation of the data and for recommendations concerning management alternatives. Major accomplishments and projects undertaken in 1986 are listed below by topic.

Shrimp

Since 1981, inshore brown shrimp populations in the Barataria Bay system have been sampled intensively before and after the opening day of the inshore season. This intensive sampling scheme is now used on an annual basis to evaluate the efficiency of the inshore fleet and to determine the success of the opening date with respect to the 100 count/pound criteria. In 1986, approximately 45% of the inshore brown shrimp population was 100 count or larger on opening day. The efficiency of the fleet was comparable to that observed in previous years with the marketable inshore population decreasing by 75% in the first week of the season.

Laboratory researchers have continued to analyze historical data sets generated by the Seafood Division's coastwide shrimp monitoring program. One such analysis involved determining the relationship between juvenile abundance as measured by the Division's inshore trawl samples, and annual NMFS shrimp catch statistics. A strong relationship was found to exist and was used successfully in predicting brown shrimp catch in 1986.

Monitoring of an extensive shrimp farming operation in Lafourche Parish was continued in 1986. The purpose of the monitoring program is to determine the potential for, and the problems associated with, such operations in coastal Louisiana.

Oysters

In 1986, using a predictive model developed at the Laboratory, a forecast was made of seed oyster availability during 1987 on the primary seed grounds east of the Mississippi River. Over the past four years these forecasts have proven reliable and have served as a basis for management recommendations concerning the seed grounds. Unfortunately, seed production on the primary grounds in 1987 is predicted to be no better than the poor production observed in 1986.

A survey of the Public Oyster Grounds in Atchafalaya and Vermilion Bays was conducted by Marine Lab researchers in September, 1986. From the high oyster densities and the vast reef areas observed, it was projected that full utilization of this resource could partially offset the poor production on the primary grounds east of the river.

Using data provided by the Louisiana Department of Health and Human Resources (DHHR) and the U.S. Army Corps of Engineers, Lab researchers identified relationships between Atchafalaya river stages and fecal coliform levels in Four League Bay, Atchafalaya Bay and Vermilion Bay. These findings have enabled DHHR to conditionally manage these important oyster producing areas.

At the request of oyster lease holders, Marine Lab personnel conducted 13 lease investigations in 1986.

Finfish

Sampling continued for a fourth year in a study to determine environmental parameters influencing distribution and abundance of young-of-the-year (YOY) spotted seatrout and red drum. While the abundance of YOY seatrout in 1986 was comparable to the previous three years, the number of YOY red drum collected in 1986 was greater than the combined total of the previous three years. These findings are noteworthy due to current concerns over the status of red drum spawning stock.

In 1986 a king mackerel tagging project was begun in conjunction with the National Marine Fisheries Service. A total of 900 mackerel will be tagged and 400 tissue samples collected.

Crabs

A study was begun in 1986 to determine the annual variability in blue crab populations in the Barataria Bay system. Historical trawl data from Coastal Study Area III is being used in the analysis.

Freshwater Diversion

Marine Laboratory scientists continued to work in close cooperation with the Louisiana Department of Natural Resources and the U.S. Army Corps of Engineers to bring about large-scale controlled freshwater diversion from the Mississippi River into coastal Louisiana.

Since freshwater diversion is perhaps the most effective way to address coastal deterioration and enhance estuarine productivity, facilitating such projects has been given top priority at the Marine Laboratory.

Cooperative Studies

In 1986, two cooperative studies were undertaken between Marine Laboratory scientists and LSU researchers. Such arrangements are mutually beneficial and allow for more complete utilization of the Laboratory's facilities.

The purpose of one ongoing study is to determine the feasibility of, and the problems associated with pond culture of red drum. The work is being conducted in the research ponds on the Marine Laboratory grounds. The other study was an investigation into triploidy and the genetic variability in oysters. The Laboratory's hatchery contributed oyster larvae and broodstock for these experiments.

Finfish Management Section

Research and Monitoring

The Finfish Section became fully operational on January 1, 1986 throughout coastal Louisiana.

Samples were taken throughout the year with monofilament gill nets composed of various mesh-sized panels. These nets were designed to capture fishes of various lengths and weights so that year class strength of particular species could be ascertained. Sample sites are strategically located in order to identify species diversity and distribution.

Small mesh beach seines, 50 feet in length, were utilized to capture young-of-the-year fish in order to determine spawning periods and success, length of time these small fish remain in the shallow marsh, and early growth rates.

Trammel nets were also used on a monthly basis to develop an index of relative abundance and standing crop of all species captured. These nets are designed to meet the legal specifications utilized by the commercial industry in order to better understand and follow commercial landings.

Section personnel were also involved in development of a finfish management plan which is now in a second draft stage. The plan contains an accumulation of research conducted on spotted sea trout, red drum, black drum, striped mullet, king mackerel, spanish mackerel, southern flounder, atlantic croaker, spot cobia, red snapper, warsaw grouper, scamp, black grouper, yellowfin grouper, snowy grouper and gulf butterfish.

A creel survey conducted in 1984 was also written up, and is in the second draft form. The survey, conducted along the entire coast of Louisiana, identifies the recreational catch and effort statistics placed on various species of fish encountered.

Finfish Section personnel are involved in tagging juvenile redfish and participating in the Marine Fisheries Initiative Program (MARFIN) to gather data to best manage the fisheries resources of the Gulf of Mexico. Tagging began in October and will continue throughout 1987. Tag returns from this project will help researchers better understand movement and migration patterns of redfish within the estuaries and into offshore waters. Finfish personnel also have the administrative duty to monitor four other MARFIN projects being conducted by the Department and Louisiana State University.

A project entitled "Catch Effort and Bioprofile Sampling of Commercially Landed Red Drum in Louisiana" is being conducted to obtain fishery dependent data. The objectives of the project are to collect catch and effort data and length frequency composition of adult red drum caught by commercial vessels in both offshore and nearshore waters, and to obtain otoliths, scales, and eye lenses from these sampled fish for age and growth and genetic structure determination. The second project "Age Structure and Growth Rates of Red Drum Landed in Louisiana" was designed to validate annulus formation in the otoliths of red drum and to estimate the age structure and growth rates of these red drum as they occur in the landings. The third project will assess all information necessary to manage red drum resources in Louisiana and in the fishery operating in offshore waters. The project will determine mortality rates, sizes at recruitment, escapement in the fishery, and will develop an index of stock abundance to be used in managing red drum stocks. The fourth project deals with king mackerel and is entitled "King Mackerel Tagging and Tissue Sample Collection in Louisiana Waters". The purpose of the project is to tag and release nine hundred fish in the waters off the Louisiana coast in an attempt to identify the existence of one or multiple stock(s) of king mackerel in the Gulf of Mexico.

Louisiana Artificial Reef Initiative (LARI)

Artificial reefs of any type are normally "fish enhancers", as habitat, more abundant food, and shelter are provided. The enactment of the National Artificial Reef Plan (NOAA Tech. Memo. NMFS OF-6, 1985) created a vehicle for all states to adopt plans which would enable them to initiate a program for reef development. Guidelines could vary according to locality and need, but would generally conform to the requirements contained in the national plan.

Representatives of Louisiana Department of Wildlife and Fisheries, Louisiana Department of Natural Resources, LSU Sea Grant Legal staff, LSU Center for Wetland Resources, Coastal Fisheries Initiative, Louisiana Geological Survey, U. S. Department of the Interior, Minerals Management Service, Concerned Shrimpers Association, Divers Association, Offshore Operators Commission, Louisiana Department of Culture, Recreation and Tourism, GCCA, and representatives of most ma-

major oil companies serve on an Ad-Hoc committee to develop a plan for Louisiana. This group developed an Artificial Reef Plan and submitted the plan to the Louisiana Legislature during the 1986 session which resulted in Act 100 (HB1111).

Since passage of this bill, the committee has developed a "donors agreement", allowing for donation of reef material to the state of Louisiana. Site selection has also been proposed, offers received for donation of platforms from petroleum producing interests, a tentative operating budget established, and public hearings scheduled. After all procedural requirements are satisfied, actual staffing will occur and work will begin.

The end result will be of tremendous benefit to Louisiana, her residents, and all fishermen, divers, and users of the fishery resource. Those platforms associated with petroleum production in the Gulf of Mexico may remain as artificial reefs under this program, rather than being removed. Fishery resources associated with these structures will also remain and hopefully increase. All users will then be able to continue their hobby or livelihood which is dependent upon these structures.

Coastal Investigation Section

Hydrological Management

At the start of the year the section continued to operate 15 coastwide hydrographic data recorders. These data were used to address problems including the West Cove (Calcasieu Lake) brine spill, brown shrimp catch predictions, white shrimp catch variability, oyster contamination complaints in Caillou Lake and Vermilion Bay, wind transport of sand dunes in coastal areas, coastwide salinity changes since 1961 and menhaden catch prediction. However, due to lack of funds for repairs and maintenance, 5 recording stations were discontinued (Coastal Study Areas 1, 4, 6 and 7) and further reductions are expected as additional breakdowns occur. The section expanded its hydrographic data quality assurance program to cover all Coastal Study Areas.

Work continued on the Map Overlay and Statistical System (MOSS) habitat quantification and mapping project in cooperation with the U.S. Fish and Wildlife Service Coastal Wetlands Ecosystems Laboratory and the Louisiana Geological Survey Coastal Protection Section.

Hypoxia (low oxygen) was noted for the 6th consecutive year on the central Louisiana shelf. The lack of tropical storms this year caused the condition to be continuous from May thru September. An additional transect was added in June, giving information on the areal extent of the hypoxia. Work continued on the Department's technical report on shelf hypoxia, utilizing PC implemented contouring analysis with the six years of information this section has gathered on the phenomena.

The section continued its participation with the Governor's Task Force on Lake Pontchartrain, including evalua-

tion of environmental changes which are occurring in the area and recommendation of guidelines to retard the destructive processes taking place.

The section established the LAMER coastal data repository, a source of biological and hydrographic data for scientists interested in the Louisiana coastal zone. The section used LAMER files in conjunction with the LSU Department of Experimental Statistics to determine effects of environmental changes on commercial white shrimp catch, and provided data for a report entitled "Ichthyoplankton In Neritic Waters Of The Northern Gulf Of Mexico Off Louisiana: Composition, Relative Abundance" using Mississippi River discharge data.

An annotated bibliography of publications of the Office of Coastal and Marine Resources was prepared for easy reference and distributed within the Department.

Personal computers continued to be integrated into daily operations e.g. electronic spreadsheets for budgets analysis, hydrographic data reduction and contouring, plankton database manipulation, and semi-automated water quality and primary productivity analyses. The section is developing statistical analysis capabilities, using PC SAS, on its newly acquired PC AT system.

LOOP

The Department's environmental monitoring effort for the Louisiana Offshore Oil Port (LOOP) continued into its ninth year. Estuarine and offshore habitats in the vicinity of LOOP facilities and along the pipeline corridors were sampled regularly to determine alterations and/or presence of contaminants.

Shrimp and bottomfish, zooplankton and benthic communities were sampled in conjunction with water and sediment samples for characterization of local habitat. Continuous records of water temperature, salinity, current velocity and tide level were also made. Monthly flights to inspect LOOP and ancillary pipeline corridors and facilities provided information on pipeline plug conditions. Repairs were requested throughout the area. LOOP operations (including brine disposal and facility repairs) were monitored.

Department personnel continued oil spill and dispersant use contingency planning in conjunction with other state and federal agencies. The section participated in the development of oil dispersant toxicity studies using static and flow-through methods, with organisms native to coastal Louisiana, and successfully encouraged private industry to fund selected studies.

A scientific article on the seasonal composition and relative abundance of ichthyoplankton in neritic gulf waters of Louisiana using LOOP data was published. LOOP information was provided for a Board of Regents project at the LSU Coastal Fisheries Institute to study the community structure of Louisiana coastal zooplankton and its relationship to environmental variability.

DOE/CALECO

The Department's participation in the U.S. Department of Energy funded study of pollution loading and environmental characterization of the Calcasieu River/Lake system continued into its fourth and final year. The Department provides administrative and technical review functions for the project, while field research is performed by McNeese State University. Additionally, a mathematical model of circulation and dispersion within the Calcasieu system is being prepared by the University of South Carolina.

Field data collection was interrupted in the third year of the project by a temporary halt in federal funding. This interruption caused the project schedule to be extended in order to recoup, as much as possible, information lost as a result of the interruption. The final report is scheduled for completion early in 1987.

The Calcasieu system can be characterized as a complex coastal lagoon system in which winds, tides, and freshwater input contribute approximately equally to circulation and dispersion. Additionally, the Calcasieu ship channel serves as an avenue for intrusion of saltwater far inland as well as contributing to a strong gravitational circulation within the system. Domestic and industrial pollutants are introduced in the northernmost areas of the system, and water quality problems indicated by depressed levels of dissolved oxygen have been recorded.

Biological communities vary to a certain extent based on the degree of human impact at a particular location.

SEAMAP

The Department continued its participation in the Southeast Area Monitoring and Assessment Program (SEAMAP), a cooperative state/federal program funded by the U.S. National Marine Fisheries Service through the Gulf States Marine Fisheries Commission. SEAMAP coordinates the collection and distribution of fishery-independent data from the northern Gulf of Mexico. SEAMAP work groups established guidelines and priorities for plankton sampling, environmental sampling and red drum research. The SEAMAP subcommittee met with Mexican fisheries researchers to discuss common goals in the Gulf of Mexico.

Day and night nekton, plankton and environmental parameters were sampled in offshore waters to 15 fathoms on week long cruises in May, June, October and December. The contract research vessel R/V Pelican was staffed with section biologists as well as personnel from other sections in the Seafood Division. Similar samples, but on a smaller scale, were taken by each coastal study area to depths of 5 fathoms in June and November. The Department participated in a squid/butterfish exploratory cruise by contributing SEAMAP funds towards vessel time.

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